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JOHN M. CLARKE, Director

THE MASTODONS, MAMMOTHS AND OTHER PLEISTOCENE MAMMALS OF NEW YORK STATE

BEING A DESCRIPTIVE RECORD OF ALL KNOWN OCCURRENCES

By

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C. A. HARTNAGEL AND SHERMAN C. BISHOP

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1922

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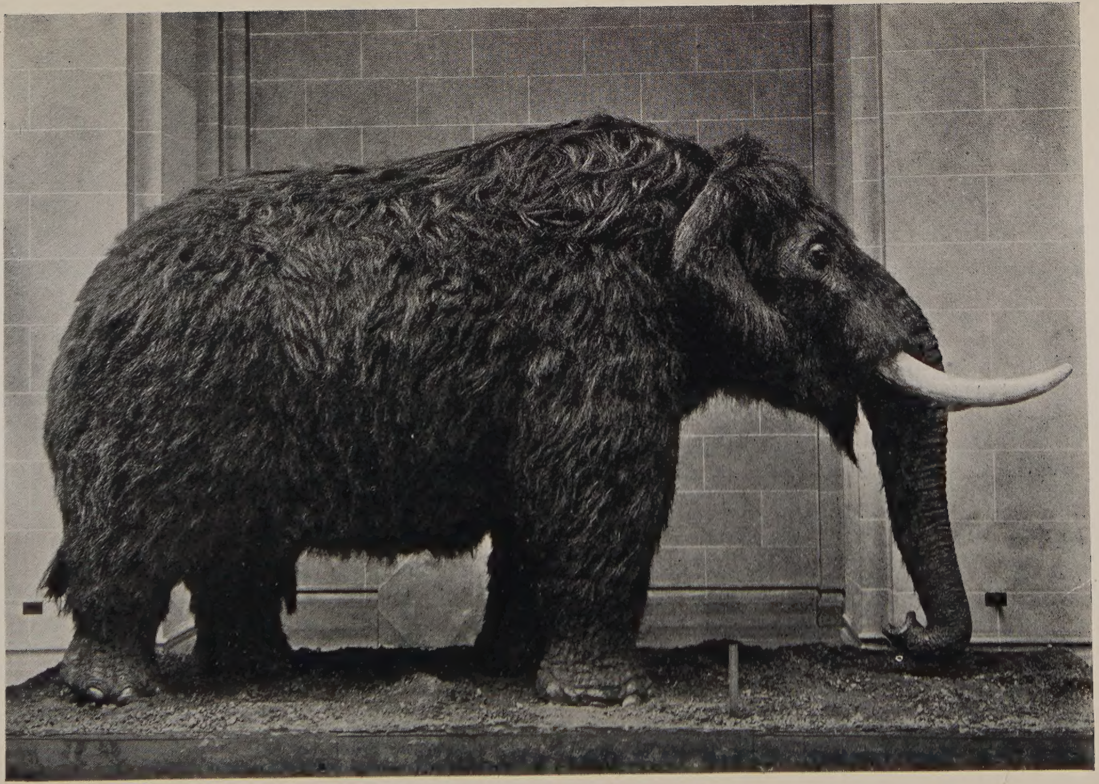
PREFACE

The elephants and mastodons of the New York fauna which disappeared with the waning of the Postglacial waters, are a subject of constant interest to our citizens, for the bones of these creatures are still being uncovered in the normal processes of agriculture and industry. The first discovery of these extinct proboscideans in America was made in this State and so extensive have he records of their occurrence now become that they picture a time, not far behind us, when the highlands of the State, and the watersheds of the Hudson valley, were traversed by these great beasts, particularly the mastodons, in vast numbers. Twenty years ago the writer, who had then some experience in excavating these remains, compiled and published a list of all known occurrences of these creatures in this State, but since then additional early records have come to light, new discoveries have been made and many specimens added to the State Museum, and it has seemed wise to reconsider he whole subject. This work has now been admirably done by my associates, Messrs. C. A. Hartnagel and Sherman C. Bishop, who have extended the record to cover all occurrences of mammalian remains in the Glacial and Postglacial soils of New York.

John M. Clarke
Director

September 1922

Plate 1



The Cohoes mastodon as restored by N. T. Clarke and C. P. Heidenrich 1922; in the State Museum.

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THE MASTODONS, MAMMOTHS AND OTHER PLEISTOCENE MAMMALS OF NEW YORK STATE

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By

C. A. HARTNAGEL and SHERMAN C. BISHOP

INTRODUCTION

The preservation of any land mammal as a fossil is an accident; its subsequent discovery frequently one. The many elements contending in the destruction of organisms make preservation of such remains the exception rather than the rule. Regions that are richly populated with fossil remains preserve but a remnant of the legions that formerly existed; regions devoid of remains of any kind may have supported an immense living world.

Fossil remains of carnivorous land mammals in New York are exceedingly rare. Only the discovery of a fox and two species of bears have been reported. Records of mastodons and mammoths are more numerous not only because the bones are larger and resist decay longer but because their very size calls attention to them, as something unusual. Remains of many smaller Pleistocene mammals which did not differ materially from those now living, have doubtless been found but not reported.

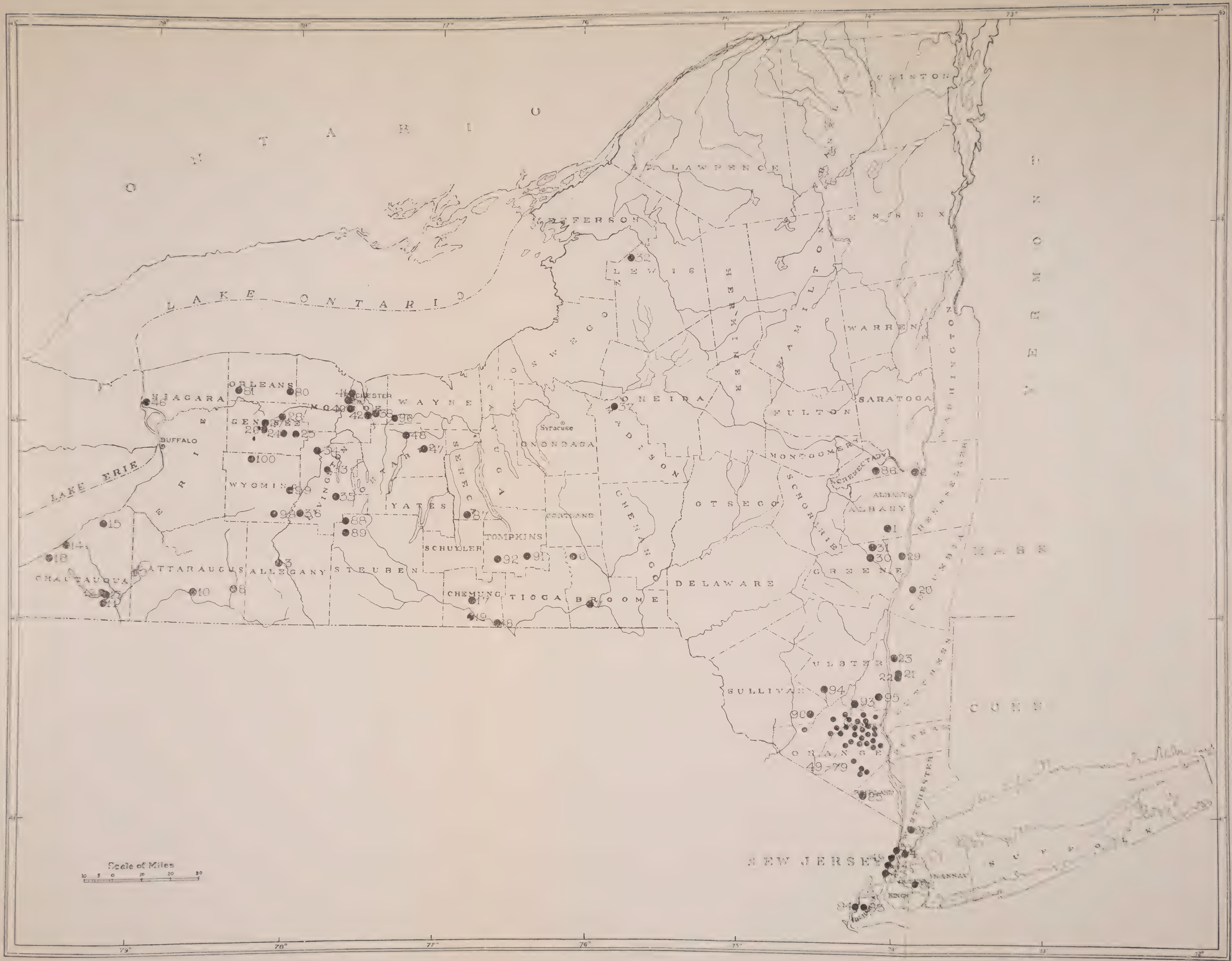
De Kay (*New York Fauna,* pt 1, Mammalia, 1842) noticed at some length occurrences of the mammoth and the mastodon, which will be referred to again in their proper places; also a "stag" termed Elaphus americanus, and a supposedly fossil horse. Prof. James Hall, in the Boston Journal of Natural History (1846, 5:390), mentioned without discussion the mastodon, mammoth, *Castoroides,* deer and elk. C. Hart Merriam's list of the Mammals of the Adirondack Region, (1886) included records of a horse and mastodon or mammoth. Joseph Leidy's " Synopsis of the Mammalian Remains of North America " (1869) gave accounts of several New York specimens including remains of elk, deer, caribou, horse and *Castoroides.* More recently, Gerrit S. Miller (" Preliminary List of New York Mammals," N. Y. State Mus. Bul. 29. 1899) included the fossil beaver (*Castoroides*), peccary, horse, mastodon and mammoth. In New York State Museum, Bulletin 19 (1898), F. J. H. Merrill mentioned the mastodon, *Cas-*

toroides and reindeer. The most complete record of mastodon occurrences thus far printed is that by John M. Clarke (N. Y. State Museum Bul. 69, 1903) in which there are about sixty distinct entries with ten or more in later publications. Rock caves have been a source of vertebrate remains, but exploration of New York caves has not resulted in the finding of numerous species such as have been discovered in Pennsylvania and elsewhere; from the great abundance and variety of species discovered in these neighboring states it would be reasonable to suppose that New York supported a similar fauna. The discovery of open caves or crevices and the accident of entombment and preservation must be depended on for any great extension of the list of fossil species in New York.

New York has proved to be particularly rich in remains of *Mastodon* and *Elephas* and in here summarizing these discoveries, they have been recorded chronologically by counties, numbered consecutively in the text and indicated on key maps, plates 2, 6, 13, showing distribution. Of the several factors contributing to the localization of mastodon remains in southeastern New York, where over one-third of the recorded specimens have been found, the early physical development of the country is doubtless the most important. Here were thousands of acres of swampy upland, freed by the recession of the great ice sheet and offering food to invading animals from the south. The land to the northwest held fewer inducements for there is nothing in the makeup of a mastodon to fit it for mountain climbing. Eastward the ancient Hudson may have acted as a partial barrier, for comparatively few remains of these animals have been recorded from New England. The largest of the existing swampy areas in Orange county, the so-called "drowned lands," cover about 17,000 acres, but it is not here that remains have been found, probably because the change from open lake to swamp has been too recent. Peat bogs and marl ponds outside the area of the "drowned lands," and the beds of extinct ponds now being used for agricultural purposes are the regions that have contributed most largely of mastodon remains.

Muck and marl deposits are natural traps in which the animals mired; and this is every year evidenced by the "bogging down" of domestic cattle. If further proof were needed it is only necessary to recall the many instances where remains have been found in positions which would admit no other explanation. In several cases too, the stomach contents have been found between the ribs, further evidence of sudden death.

This record is believed to be reasonably correct and complete but the writers would be grateful for additional data and for corrections to errors existing in the list herewith presented.



Map showing distribution of mastodon remains in New York State.

RECORDS OF MASTODON * REMAINS

ARRANGED BY COUNTIES

Albany County

1 1835? *Coeymans.* Mastodon or mammoth. This specimen was found previous to 1842, but the exact date is not known. W. W. Mather,[1] after mentioning the discovery of supposed fossil elephant bones in Green county, states: "Another was found on the Helderberg mountain, in a bed of shell or lake marl, where it appeared to have been mired in this material, on the bank of a small pond-hole or marsh. This was found on the farm of Mr. Shear, 4 or 5 miles west of the Hudson, in the township of Coeymans, Albany county. A tusk of the animal was brought to Albany. Most of the skeleton is supposed to be still at the locality where the tusk was found. The tusk was small for one of these animals." Professor James Hall,[2] who also visited the Coeymans locality, states that "the bones were imbedded in a fresh-water marl, or rested upon the clay beneath the marl. There is here no possibility of their having been transported; and the inference of Doctor DeKay,[3] that these animals perished while in search of food in swamps, seems substantiated by the position of their bones."

The find above reported is probably the same as that recorded from the town of Coeymans, in French's Gazetteer (1860) which states, "The fossil remains of a mastodon were found on the farm of Mr P. Gidney, 6 miles west of the river."

Sir Charles Lyell's[4] reference of this occurrence follows:

"Albany and Greene counties.— Mr Lyell examined, in company with Mr Hall, two swamps west of the Hudson river, where the remains of mastodon occurred in both places at a depth of 4 or 5 feet, precisely in such situation as would yield shell marl, and peat, with remains of existing animals in Scotland. Cattle have recently been mired in these swamps."

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* *Mammut* (Blumenbach, Naturges, ed. 6, 1799, p. 698), is the earliest name given to the fossil probascidean commonly called the American mastodon. The specific name *"americanum"* was supplied by Kerr.

[1] Geology of New York, pt 1, 1843, p. 44.

[2] Geology of New York, pt 4, 1843, p. 367.

[3] Zoology of New York, pt 1, 1842, p. 104.

[4] In Amer. Jour. Sci. 1844. v. 46, p. 322. From article by Sir Charles Lyell originally printed in Proc. London Geol. Soc. v. 4, no. 92. See also Lyell's Travels in North America, v. 1, 1845, p. 54. Sir Charles Lyell travelled in America in 1841 and with Professor Hall visited several localities where mastodons had been found, including the one in the town of Coeymans. Further references to his visits to mastodon localities will be noted under the counties of Livingston, Monroe and Niagara.

The date of this find is given by Clarke as 1835? (New York State Mus. Bul. 69, 1903, p. 929). None of the bones of this find are believed to have been preserved and there are no records showing that they were ever received in the State Museum or the Albany Institute. There is thus no direct evidence to determine whether the animal was a mastodon or a mammoth. On the basis of other known finds in this section of the State the chances are that it was a mastodon.

2 1866. *Cohoes* (plates 1, 3, 4). The peculiar circumstances under which the skeleton of the Cohoes mastodon was discovered, have given the specimen wide publicity. The lower jaw and a single foot bone were found on a ledge of rock, on the side of a pot hole, by workmen excavating for the foundations of the Harmony Mills at Cohoes, N. Y., in September 1866. Continued excavations revealed the principal parts of the skeleton at a lower level of the same pothole; and in February of the year following, a few other bones (those of the right fore leg and foot) in a smaller pothole about 60 feet to the southwest of the larger one. Most of the bones were lying on a bed of clay and broken slate above a layer of waterworn pebbles. Above the bones there was an accumulation of muck, peaty soil with fragments of limbs and rotten, beaver-gnawed wood and artificial fill, almost 60 feet in thickness.

The surface of the rock in which the potholes were excavated lies at a level almost 100 feet above the present surface of the river bed below the Cohoes falls. Hall[5] thought the potholes had been formed by the action of surface waters falling through crevasses in the ice sheet to the rock beneath but this interpretation has been generally abandoned in favor of the theory that they are of a postglacial origin. Quoting H. L. Fairchild, O. P. Hay[6] states that at the time of the withdrawal of the ice sheet, the site of Cohoes was depressed about 350 feet below the present level and covered with a thick deposit of sand and clay laid down in the bed of Lake Albany. With the elevation of the land, Lake Albany was drained and the ancient Mohawk (Iromohawk) cut through the deposited sands and clays, reached bedrock and drilled the potholes.

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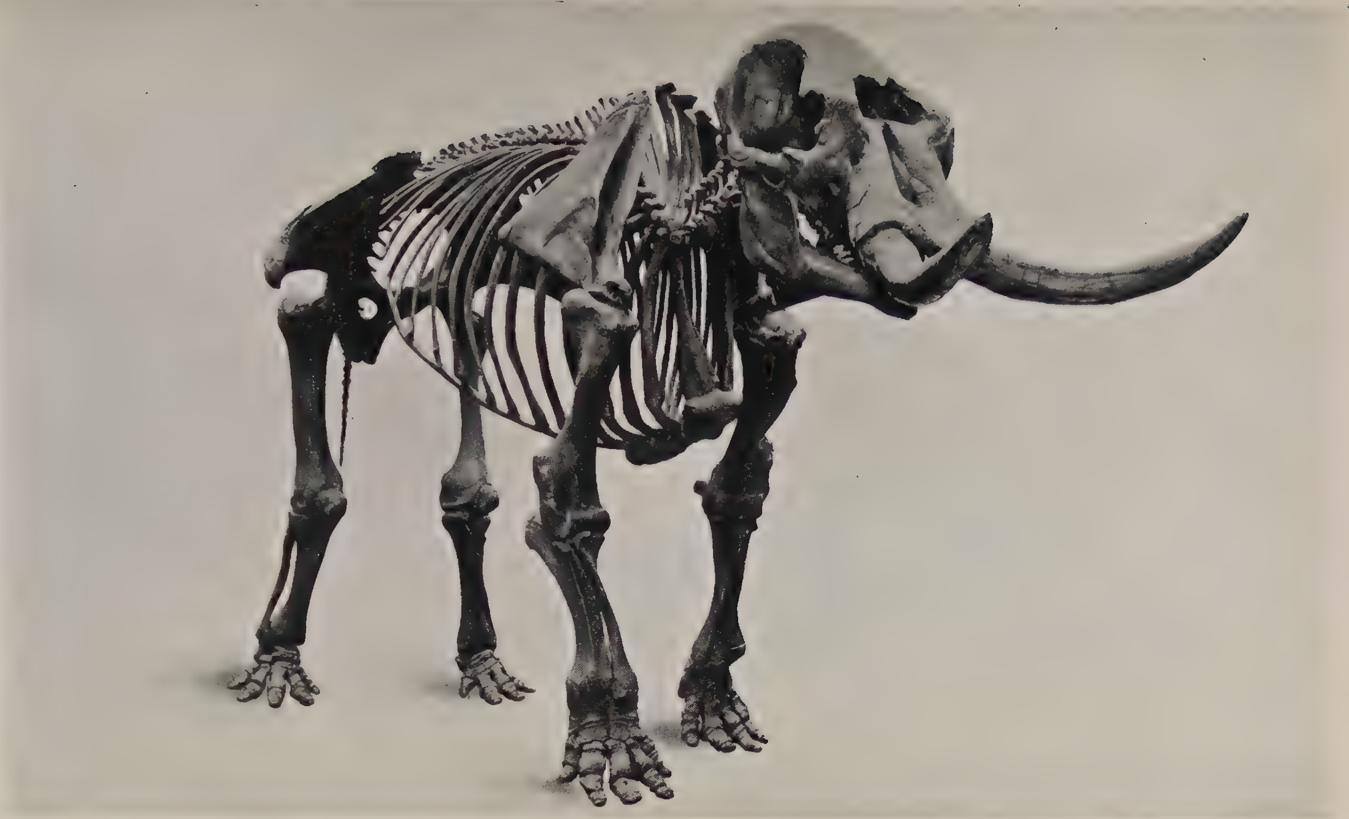
[5] N. Y. State Cab. Nat. Hist. 21st Annual Rep't, 1871, p. 105.

[6] Science 1919, 49:379.



The Cohoes mastodon. Skeleton in New York State Museum.

Various theories have been advanced to account for the presence of the skeleton in the potholes. Hall not only provided a glacial origin for the holes but for the mastodon itself which he believed to have been entombed in the glacier, dismembered by action of the ice and dropped, part in one pothole and part in another.

Clarke[7] was of the opinion that the skeleton belonged to the period of swamps which covered the area after the fall of the postglacial waters. O. P. Hay[8] stated his opinion as follows: "We may fairly assume that it [the mastodon] had only recently died and was lying on the flood plain not far above the potholes. No disarticulated bones could have been distributed as this skeleton was. The bones must, perhaps without exception, have been held together by ligaments and probably much of the flesh remained. At this moment the river rose and swept the flood plain carrying the cadaver over the potholes."

It is certain that the skeleton was deposited long after the potholes had been drilled, for the majority of the bones rested on a bed of clay and broken slate above a layer of water-worn pebbles and gravel at least 10 feet thick. Above the bones the muck and peat deposit was at least 50 feet thick. It would seem therefore that the bones were deposited while in the flesh in potholes which were abandoned except at periods of high water, and subsequently covered by the accumulated debris of years.

Allegany County

3 1903. *Belvidere.* The only find of a mastodon in Allegany county of which we have knowledge is the one mentioned as a news item in the American Geologist (Jan. 1904: 33:60). "Remains of a large mastodon were discovered recently in the village of Belvidere, N. Y. They were unearthed by Dr James Johnson of Bradford and Mr Alban Stewart of the Smithsonian Institution. The remains consist of three ribs and four vertebrae, each of the latter being 6 inches in width, indicating a very large individual."

Bronx County

4 1880. *Morrisania.* Mastodon or mammoth. Dr N. L. Britton[9] has given the following account of this find: "A mastodon's tusk was recently found at Morrisania, N. Y., by Mr R. Stoker, in

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[7] N. Y. State Mus. Bul. 69, 1903, p. 930.

[8] Science 1919, 49:379.

[9] School of Mines Quarterly, May 1880, p. 198–99. *See also* N. Y. Acad. Sci., Trans. 1885, 5:15.

an excavation for a cellar. It was obtained from a stratum of drifted material about 4 feet in thickness, underlain by gneiss rock, and covered with 6 feet of artificial filling. The specimen was taken from one corner of the excavation, about 6 feet from each wall, and 1 foot above the floor. No other parts of the animal were found, nor is it likely that there would be by further exploration as the material consists of drifted dirt and pebbles, and the tusk was probably brought there from a distance. The specimen has been donated to the School of Mines by Mr Stoker."

5 1887? *Harlem.* Prof. J. F. Kemp[10] states that, "in the Columbia College collection there is a mastodon tooth from that [the drift] of Westchester Co., just across the Harlem river." The exact locality or the date of this find has not been ascertained but the locality can not be far from Morrisania where a portion of a mastodon's tusk was found. The part of Westchester county above referred to is now a part of Bronx county.

Broome County

6 1875. *Center Lisle.* There are in the museum of Cornell University, a humerus and a rib, identified as belonging to a mastodon found a few hundred yards north of Center Lisle[11] at 1100 feet elevation. According to Professor Tarr,[12] the remains were found in a boggy place where a spring emerges from the base of a gravel terrace. The remains occurred in such a situation as to warrant the inference that the animal may have mired there after the valley was cut down to its present level. He states too that it is equally possible to infer that the remains were washed out of the gravels and concentrated in this swampy area, but with present information it is not possible to decide between these alternatives.

7 1887? *Binghamton.* Mastodon or mammoth. In 1887 there was presented to the State Museum by H. L. Griffis, the "waterworn extremity of tusk of mastodon, found in drift while excavating for a sewer at Binghamton, N. Y." (N. Y. State Mus. Nat. Hist., 41st Annual Rep't, 1888, p. 30).

Binghamton is situated at the junction of the Chenango and Susquehanna rivers at an elevation of 845 feet. No direct evidence presents itself which determines whether the tusk belonged to a mastodon or an elephant.

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[10] N. Y. Acad. Sci. Trans., 1887, 7:52.

[11] The locality is given as *Lisle,* in Am. Jour. Sci., 1875, 10:390.

[12] Geol. Atlas U. S., Folio 169 (Field ed.), 1909, p. 201.

In this connection it may be worthy of remark that Binghamton lies in a valley where during glacial retreat there flowed a great river, whose waters were supplied from the melting ice to the north. It is, of course, possible that the tusk was brought down by this river from the glacial ice, in which case the tusk is probably that of a mammoth. On the other hand, the animal may have lived later and the tusk been buried in the river drift; if so, the chances favor its belonging to a mastodon.

Cattaraugus County

8 1843? *Hinsdale.* Mastodon or mammoth. At Hinsdale, Hall[13] reports in his list of mastodons, "a tusk, with some horns of deer, was found 16 feet beneath the surface in gravel and sand." Nothing further is known of the character of the remains and it is not known whether the tusk was taken out and preserved. This find is at present interesting chiefly for the association of the deer horns found with it. Hinsdale is at an elevation of 1484 feet.

9 1906. *Conewango Valley.* Mastodon or mammoth. In September 1906, C. N. and W. H. Hoard reported to the State Geologist the finding of parts of a skeleton represented by 40 to 50 bones, mostly vertebrae and foot bones. The largest bone found was a femur a little over 2 feet in length and 13 inches in circumference midway between the ends; after seasoning 10 years it weighed a little over 20 pounds. The remains were uncovered by a steam dredge in excavating for the state ditch along the Conewango creek in a shelf of blue clay 10 or 12 feet high. The bones were found imbedded in the blue clay overlaid by about 3 feet of black muck and about 6 feet below the natural surface of the ground. At present writing these bones are in possession of William T. Fenton, Conewango, N. Y. This locality is close to the boundary of Cattaraugus and Chautauqua counties. The remains are very probably those of the mastodon but they have not been identified by anyone capable of close discrimination of their generic characters. (See Clarke, N. Y. State Mus. Annual Rep't Director for 1906, p. 60).

10 1908. *Kill Buck.* "A single tusk has been reported as found at this date near the banks of the Great Valley creek. Details are wanting." The above brief account quoted from Clarke (N. Y. State Mus. Bul. 140, p. 46) has not been supplemented by later information, and so the generic character of the tusk still remains in doubt. The elevation of the creek at Kill Buck is 1400 feet. The

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[13] Geology Fourth Dist., 1843, p. 364.

creek empties into the Allegany river less than a mile from Kill Buck, which is nearly 3 miles east from the great northern bend of the Allegany. The locality is nearly midway between Hinsdale and Conewango, the other two localities where fossil bones have been found in the county.

Chautauqua County

11 1843? *Jamestown.* In 1843 Hall reported that a tooth of a mastodon had been found at Jamestown, several feet below the surface, in gravel.

Fossil teeth from the same neighborhood, at first thought to belong to the mastodon, were described as early as 1835, but these have proved to be teeth of the buffalo. Jamestown is located near the outlet of Chautauqua lake at an elevation of 1300 feet and is 24 miles distant from Lake Erie. (See Amer. Jour. Sci., 1835, 27:166.

12 1871. *Jamestown.* Large mastodon. Two skeletons were found in this year at the same locality. The larger one[14] has been rather fully described by the late Hon. Obed Edson in his " History of Chautauqua County " (1894, p. 34-36). His account follows:

" In August 1871, portions of a gigantic mastodon were found 1 mile north of Jamestown near the summit of the low hills dividing the valley of Chautauqua lake from that of the Cassadaga. This important discovery within our county, of relics of life in the Champlain period (perhaps of the Recent period), demands a full description. The exhumation and preservation of the bones were fortunately intrusted to the late Prof. Samuel G. Love, assisted by Professors Burns and Albro, and are now in the museum of the Jamestown High School. The following is from an article written by Prof. S. G. Love, published in the Jamestown Journal:

> On the east side of the Fredonia road, about 1 mile north of Jamestown, is the farm of Joel I. Hoyt. About 500 yards from the road is a sink or slough covering about an acre, possibly more in extent, and varying from 2 to 8 feet in depth, and fed by several living springs. Cattle have been mired and lost there since the farm was first occupied. Mr Hoyt drained the sink and left the muck to dry, and later commenced an excavation there. The work of excavating had continued a little more than a week, when the workmen began to find (as they supposed) a peculiar kind of wood and roots, imbedded some 6 feet beneath the surface. For several days they continued to carry the small pieces into an adjoining field with the muck, and to pile the larger ones with pine roots and stumps to be burned. But Mr Hoyt discovered unmistakable evidences of the remains of some huge animal. At once there was a change

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[14] Another description of this skeleton and that of a smaller one found nearby is given by T. A. Cheney under date of November 13, 1871, in the American Naturalist 1872, 6:178-79. See description, p. 16.

in the procedure, in order to secure specimens and determine their character. It was difficult to determine the precise position of the remains, as they were much disturbed and partially removed before any special notice was taken of them. From the best information I could get, I conclude that the body lay with the head to the east, from 4 to 6 feet beneath the surface, and in a partially natural position. Many of the bones were, however, out of place. The lower jaw was about 5 feet from the head, and lay on the side crushed together so that the rows of teeth were very near each other. The tusks extended eastwardly in nearly a natural position, and, judging from the statements of Mr Hoyt and the workmen, they must have been from 10 to 12 feet in length. After digging into the gravel and clay about 10 inches I found traces of a rib, decayed, but distinctly marked, over 5 feet in length. Where the body must have lain were found large quantities of vegetable matter (evidently the contents of the stomach) mostly decayed, in which were innumerable small twigs varying from one-half inch to 2 inches in length. The remains were all in a very forward state of decay; and when I reached the ground I found it impossible to do little more than had already been done to preserve them. Many of them were picked up in the field, whither they had been drawn with the muck, and from piles of roots and stumps. Specimens secured: (1) Tip of one of the tusks; length, 3 feet, 7½ inches; diameter, 6½ inches. (2) Middle section of the other tusk; length, 2 feet, 5 inches; diameter, 7½ inches. (3) Six teeth; length of longer ones on the crown, 7½ inches; weight, 5½ pounds; length of shorter ones, 4½ inches; weight, 2½ pounds. (4) Left side of under jaw containing two teeth in situ; length preserved, 2 feet, 1 inch; depth from the crown of the teeth, 10½ inches; thickness, 6 inches. (5) Pieces of scapula (shoulder blade) from 10 to 13 inches long and 4 to 7 wide. (6) Sections of ribs; 12 to 18 inches long. (7) Head of the femur (thigh bone). (8) Portions of the vertebrae of the neck. (9) Fragments of the cranium (skull). (10) Various other pieces not yet identified. The animal was undoubtedly the American mastodon (Mastodon Maximus, or Mastodon Americanus of some authors). A single tooth is sufficient to distinguish it from the elephant. The grinding surface of a mastodon's tooth is covered with conical projections (whence the name of the animal) while that of the elephant is flat. The size of the living animal must have been, in height, from 10 to 15 feet, and in length to the base of the tail, from 15 to 20 feet. (I ought perhaps to say that although I am quite satisfied with the above estimate of size, I have been told by very good authority that it is an underestimate.)

The following is from a paper read by Professor Love before the Chautauqua Society of History and Natural Science, July 16, 1885. Referring to the article in the Journal he says:

" When we arrived at the farm we found the rain of the previous night had filled the excavated portion of the sink with water to the deph of 2 or 3 feet. At the limit of the digging on the eastern side stood a bank or wall of the muck about 4½ feet high. After reopening the ditch and draining off a part of the water, we commenced an examination of this bank, in which the lower jaw was soon found. It was nearly 3 feet from the surface; the sides were crushed together, the right side of the jaw being uppermost. It was removed with great care in a blanket, but the upper (right) half crumbled into small pieces as soon as it was exposed to the air for a few minutes. I am of opinion that the animal died in his tracks from some natural cause. He may have been drowned or mired, but if so the sink must have been at that time much deeper than at present, and, judging from the make of the land around the sink, I should say it may have been deeper by many feet. The slight dislocation or disturbance of the remains I have no doubt were due to causes which would naturally operate in a slough, into which large trees would be liable to fall and finally sink to the bottom. In any event the remains must have been buried much deeper in the muck and water for many, many years in order to escape complete destruction, and the fact that the bones of those animals were permeated with large proportions of fatty matter would help greatly to preserve them.

"The twigs found in such large quantities where the stomach would naturally be were found, upon a miscroscopical examination and camparison, to be the same kind (genera and species,) as the cone-bearing trees (pine and spruce) of the present day. Mingled with the twigs was a mass of yellowish fetid matter, probably the remains of some vegetation which did not possess the staying qualities of the balsamic cone-bearers."

13 1871. *Jamestown.* Small mastoden. In the preceding account of the large mastodon found at Jamestown mention is made of another description of this skeleton by T. A. Cheney. In the body of his account such expressions as *larger skeleton, smaller animal* are found, and the concluding paragraph of his article is as follows: "The smaller skeleton (found at a short distance from the larger one) was probably 7 feet in height; tusks 4 feet long, 4 inches wide, teeth 3½ inches in length; sections of jaw and rib bones were also found." Although no mention is made of the smaller mastodon by Obed Edson in his original account of the larger skeleton, a letter received from him in 1919 stated that the skeletons of four mastodons had been found in Chautauqua county. Mr Edson also stated in his letter that some teeth of other mastodons and elephants had been found in the county but was unable to give any definite data regarding the other finds. The measurements given of the smaller skeleton at Jamestown indicate the smallest mastodon of which we have definite knowledge in New York State.

14 1871. *Portland (?).* Mastodon or mammoth. We are indebted to William L. Bryant of the Buffalo Society of Natural Sciences for the following memorandum relating to a fragment of a tusk in the Buffalo museum: "From G. W. Brud, Silver Creek, N. Y., a fragment of a tusk of a mastodon [the tusk measured 13 feet long] dug out of a gravel bank in Portland (?), Chautauqua county."

15 1894. *Sheridan.* This specimen was discovered by Robert Dahlman in April 1894, on his farm, which is in the town of

Sheridan, one-half mile west of the Hanover town line, and 2½ miles from Lake Erie. The farm is along the main highway, running from Buffalo to Erie, Pa., and here follows the beach of glacial Lake Warren for several miles. The beach is at an elevation of 755 feet, or 183 above the level of Lake Erie. A second or higher beach of Lake Warren is here well developed, lying parallel to it one-half of a mile to the southeast and 30 feet higher. At the south, beyond this higher Warren lake beach at a little more than a mile distant is the still older beach of glacial Lake Whittlesey, 40 feet above the highest Warren beach. At the place where the bones were found, the lower Warren beach is not over 300 feet wide with a narrow strip of muck land on both sides, and it was in this muck 150 feet south of the highway (landward side of the beach) that the bones were found. The muck at the locality is about 2 feet thick, and below that 3 feet of quicksand, underneath which is a hard bed of sand on which all the bones were found, except the skull. The tusks were driven into the sand a couple of feet. From the position in which the bones lay, it would seem as if the mastodon had come up over the old lake beach and plunged headfirst into the quicksand.

The remains found consisted of the skull fairly well preserved, one tusk with the tip broken off measuring 7½ feet long and 7 inches in diameter. The other tusk had the tip preserved, but the base was broken off and measured about 4 feet in length. Other bones found were a number of vertebrae, part of the leg and shoulder bones. Twelve teeth were found, some of which were 4 inches across and weighed 4 pounds each.

16 1902. *Westfield.* Mastodon or mammoth. We are indebted to Doctor Clarke, who visited this locality, for the details of this find. He states[15] that the bones were found " on property of Mrs Alice Peacock, alongside the Nickel Plate Railroad. The bones lay on pavement of heavy boulders and under several feet of black clayey muck. They consisted of one tusk (6 feet, 2 inches, and highly curved), seventeen ribs, eight pelvic and lumbar vertebrae, patella and parts of scapula and pelvis." No direct evidence is at hand to determine whether the remains were those of a mastodon or mammoth. The highly curved character of the tusk mentioned does not warrant any generic determination such as might be possible if the tusk were double curved. It is not known what disposition has been made of Westfield remains. The locality where

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[15] N. Y. State Mus. Bul. 69, 1903, p. 863, 933.

the bones and tusk were found is a little more than a mile from, and 140 feet higher than Lake Erie.

Chemung County

17 Before 1757. *Chemung.* Chemung is an Indian name meaning big horn or great horn, and it is evident from the following account by Beauchamp[16] that at least one tusk of a mammoth or mastodon had been found in this country before the coming of the early white settlers. "Chemung has various forms, as that of Skeemonk in 1777, and Shimango in 1779. In 1757 the French spoke of the 'Loups of Chaamonaqué or Theoga,' meaning the Delawares living at Tioga. It was written Shamunk in 1767, but usually Chemung. The river and an Indian village bore this name, which meant big horn. The village was burned in 1779. Zeisberger has wschummo for horn, and the locative may be added. Spafford said: 'Chemung is said to mean big horn, or great horn, in the dialect of the Indian tribes that anciently possessed this country. And that a very large horn was found in the Tioga or Chemung river is well ascertained.' This was a Delaware name, and the river had another of similar meaning. In Schoolcraft's larger work[17] (5:669) is a communication from Thomas Maxwell, who gave the usual definition and said that the name came from a large horn or tusk found in the river. Of course this must have been in colonial times to have originated the Delaware name. The early settlers found a similar one in the stream in 1799. It was sent to England, and an eminent scientist called it the tusk of an elephant or some animal." In the communication referred to above, Maxwell also states that the tusk was found embedded in sand, and the year given is "about 1794" instead of 1799.

According to Thomas Maxwell, the tusk from which Chemung derived its name, had been preserved by the Indians, as shown in the following paragraph[18]: "The name of the river is given in the journal of Col. Gansevoort as the Tioga. It has since been called the Chemung — and it is said it was so called from a large horn having been found in the river near Bydelman's, by the Indians — Chemung meaning great horn. The Muncies and Delawares called it Conongue, which in their language means horn in the water. A similar horn was found in the water at the lower end of the Upper Narrows, by some of the early settlers. Captain Daniel McDowell, a former resident of Chemung was captured at Shawanee on the 12th of September, 1782, by the Indians, and carried to Niagara, and thence to Quebec. While a captive among the Indians he saw (it is believed at Quebec,) the identical horn which gave the name of Chemung to the river theretofore called Tioga. He stated to the writer in his life time that it was a counterpart of the one found at the Upper Narrows, about the year 1791. Captain McDowell had seen both, and was well calculated to give an opinion in the matter. The river is still called Tioga above its junction with the Cohocton, at Painted Post, and to its head, in the neighborhood of Blossburgh, Pennsylvania."

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[16] N. Y. State Mus. Bul. 108, 1907, p. 42.

[17] Information respecting the History, Condition and Prospects of the Indian Tribes of the United States by Henry R. Schoolcraft, Philadelphia, 1855.

[18] Brigham's Elmira Directory for 1863 and 1864. Elmira 1863, p. 16, 17.

18 1788. *Chemung river* (upper narrows). Mastodon or mammoth. In the preceding account, the early find with date given as about 1794, should probably be 1788 in which case the occurrence would be the same as the one of which the account follows:

"A Description of a Horn or Bone, lately found in the River Chemung, or Tyoga, a western Branch of the Susquehanna, about 12 miles from Tyoga Point: Communicated by the Hon. TIMOTHY EDWARDS, of Stockbridge, Esq.; in a Letter to the Rev. Joseph Willard, D. D.

January, 1788.

"It is 6 feet 9 inches long, 21 inches round, at the large end, and 15 inches, at the small end. In the large end is a cavity, 2½ inches in diameter, much like the hollow which is filled with the pith of the horn of the ox: This is only 6 inches deep. Every other part is, or appears to have been solid. The exteriour part, where entire or not perished, is smooth; and in one spot of a dark colour. The interiour parts are of a clear white, and have the resemblance of well burnt, unslacked lime stone; but these can be seen only where it is perished, tender, and broken. From one end to the other, it appears to have been nearly round; and on it there have been no prongs or branches. It is incurvated nearly into an arch of a large circle. By the present state of both the ends, much of it must have perished; probably 2 or 3 feet from each end. From a general view of it, there is reason to believe, that in its natural state, it was nearly a semicircle of 10 or 12 feet. The undecayed parts, particularly the outside, send forth a stench, like a burning horn or bone. Of what animal this is the horn or bone, and what has become of this animal, are questions worthy of the curious and learned."[19]

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[19] From Memoirs of the American Academy of Arts and Sciences, v. 2.

Another brief account of the tusk is given by Mitchill[20] who states that the tusk was found, "at Chanango, in New York, near the point where the Susquehannah passes into Pennsylvania." DeKay[21] refers to a tooth found on the banks of the Susquehannah, near Tioga, March, 1786, and states that the tooth was figured in the Columbian Magazine. Although the date of publication of the magazine is not given by DeKay, it is believed that he had reference to the figure in the November number of 1786 (1:103), where figures are given of a thigh bone, a tusk and a tooth, which are supposed to have been brought by Major Craig from Ohio. Concerning this, Mitchill states, "Of this species appears to be the animal, whose remains were brought by Major Craig from the banks of the Ohio, in 1786. They consisted of a thigh bone, part of a tusk, and a portion of the jaw with the grinders. They were figured by Colonel DeBrahm, and published in the Columbian Magazine, at Philadelphia, vol. 1, p. 103-107."

19 1853. *Elmira.* Mastodon or mammoth. The following account by Maxwell relates to a tusk, "found on an island in the river below Elmira, a few weeks since, and it is now here. I have recently examined it. It is about 4 feet in length, of the crescent form, perhaps 3 to 4 inches in diameter. Capt. Eastman saw it yesterday, and with others who have seen it, pronounces it to be ivory, and a tusk of some large animal, probably now extinct. This is the third horn or tusk which has been found in the Chemung so that the name is likely to be perpetual."

Columbia County

20 1705. *Claverack.* Cotton Mather, of witchcraft ill-fame, has been generally credited, but incorrectly, with the authorship of the earliest printed account of the discovery of mastodon remains. In a letter to Doctor Woodward of England, dated November 17, 1712 and published in the Philosophical Transactions of the Royal Society of London for 1714, 29:62 Mather described briefly, ". . . bones and teeth of some large animals found lately in New England" and, giving a literal interpretation of the biblical

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pt 1, p. 164 (1793). See also article by George Turner in Trans. Amer. Phil. Soc, 1799, 4: 514. Brief account of the tusk above described and refers to publication above cited.

[20] Geology of North America, in Cuvier. Theory of the Earth, 1818, p. 383, New York.

[21] DeKay, Nat. Hist. N. Y. Zool. pt. 1, 1842, p. 101.

tatement, “there were giants in the earth in those days,” judged he remains to be of antediluvial giant men. But Mather's nformation was derived from a letter he had received from Gov- rnor Joseph Dudley, dated Roxbury, July 10, 1706, and from an tem published July 30, 1705 in the Boston News Letter.

B. Green, editor and printer of the Boston News Letter, gives the ollowing account: “New York, July 23. There is a prodigious Tooth brought here, supposed by the shape of it to be one of the ar great Teeth of a man; it weighs four pound and three quarters, he top of it as sound and white as a Tooth can be, but the Root is uch decayed, yet one of the fangs of it holds half a pint of Liquor; t was lately dug up, a great way under ground in the side of a ank or Hill 30 or 40 Foot above it, at or near a place call'd Claver- ck, about 30 miles on this side of Albany, and is looked upon here s a mighty wonder, whither the Tooth be of Man or Beast: They lso dug up several Bones, which as they came to the Air crumbled way: They say one of them which is thought to be a Thigh-bone as 17 Foot long. There is since another Tooth taken up in the ame place, which is a Fore Tooth flat and broad, and is as broad s mans Four Fingers, which I have not yet seen; but the other I id see, and t'was brought here by a Gentleman of the Assembly: hey dug up several Trees in the same place of great bigness.”

A short extract from the above account, without reference to the urce, is given in Dunlap's History of the New Netherlands 1840). DeKay (1842) incorrectly credited Dunlap's account to e Phil. Trans. Roy. Soc. of London for 1705.

Governor Dudley's letter to Mather, which is concerned particu- rly with an account of specimens found some miles south of Al- ny, states concerning the teeth from Claverack: “. . . one of e same growth, but not of equal weight, was last year presented my Lord Cornbury, and one of the same figures exactly was own at Hartford of near a pound weight more than this.”

As an interesting commentary on the thought and learning of the ne in matters pertaining to natural science, Cotton Mather's com- unication taken from the Transactions of the Royal Society, is oted in full: “The first letter directed to Doctor Woodward, is ted at Boston, in New England, Nov. 17, 1712. In this the riter gives an Account of a large Work in Manuscript, in two lumes in Folio, but does not name the Author. This, according the account of it, is a large Commentary upon some Passages in Bible interspers'd with large Philosophical Remarks taken out of Natural Historians, and the Observations of himself and others, more particularly as to Matters observ'd in America, whence he entitles the Work Biblia Americana. This Work Dr. Mather recommends to the Patronage of some generous Mecaenas, to promote the publication of. As a specimen of it, he transcribes a Passage out of it, being a Note on that Passage in Gen. Chap. 6. V. 4 relating to Giants; and confirms the Opinion of there having been in the Antediluvian World, Men of very large and prodigious Statures, by the Bones and Teeth of Some large Animals, found lately in Albany in New England, which for some Reasons, he judges to be Human; particularly a Tooth brought from the Place where it was found to New York, 1705, being a very large grinder, weighing 4 pounds and three-quarters, with a Bone, suppos'd to be a Thigh-bone, 17 Foot long. He also mentions another Tooth, broad and flat like a Fore-Tooth, four fingers broad: the Bones crumble to pieces in the air after they are dug up; they were found near a place call'd Claverack, about 30 miles on this side of Albany. He then gives the Description of one, which he resembles to the Eye-Tooth of a Man; he says it has four Prongs, or Roots, flat, and something worn on the top; it was six inches high, lacking one eighth, as it stood upright on its Root, and almost Thirteen Inches in circumference; it weighed two pounds four ounces Troy weight: There was another near a pound heavier, found under the Bank of Hudson's River, about fifty leagues from the Sea, a great way below the Surface of the Earth, where the Ground is of a different colour and Substance for seventy five Foot long, which they suppose to be from the rotting of the Body, to which the Bones and Teeth did, as he supposes, once belong. It were to be wished the Writer had given an exact Figure of these Teeth and Bones."

It may be pointed out that the tooth mentioned by Mather in the above account as resembling "the Eye-Tooth of a man," came from the west bank of the Hudson, the locality as given by Dudley being "some miles below the city of Albany, about fifty leagues from the sea." The tooth, "near a pound heavier," the specimen mentioned by Dudley as being shown at Hartford, was doubtless the Claverack fore tooth, "flat and broad . . . as a man's four fingers."

In 1713, English ministers and governors stationed abroad were instructed to promote the welfare of the Royal Society of London by contributing specimens and by replying to any inquiries addressed to them, concerning the countries to which they were delegated. As a result of these instructions, Lord Cornbury sent to the secretary of the Royal Society one of the teeth and some of the bones found t Claverack in 1705. A letter from Lord Cornbury, dated at New York and addressed to the secretary, gives further details of the iscovery of the specimens and an account of the excavations carried on under his (Cornbury's) direction.

"I did, by the Virginia fleet, send you a Tooth, which, on the outside of the box, was called the tooth of a Giant, and I desired t might be given to Gresham College: I now send you some of his ones, and I am able to give you this account. The tooth I sent was found near the side of Hudson's river, rolled down from a igh bank by a Dutch country-fellow, about twenty miles on this ide of Albany, and sold to one Van Bruggen for a gill of rum. Van Bruggen being a member of the Assembly, and coming down o New York to the Assembly, brought the tooth with him, and how'd it to several people here. I was told of it, and sent for it o see, and ask'd if he would dispose of it; he said it was worth othing, but if I had a mind to it, 'twas at my service. Thus I came y it. Some said 'twas the tooth of a human creature; others, of ome beast or fish; but nobody could tell what beast or fish had such tooth. I was of opinion it was the tooth of a giant, which gave e the curiosity to enquire farther. One Mr. Abeel, Recorder of lbany, was then in town, so I directed him to send some person o dig near the place where the tooth was found; which he did, and at you may see the account he gives me of it, I send you the origi-al letter he sent me: you must allow for the bad English. I desire ese bones may be sent to the tooth, if you think fit. When I go o Albany next, I intend to go to the place myself, to see if I can iscover anything more concerning the monstrous creature, for so think I may call it."

Mr Abeel's letter runs thus:

"According to you Excellency's order, I sent to Klaverak to make further discovery about the bones of that creature, where the reat tooth of it was found. They have dug on the top of the bank here the tooth was roll'd down from, and they found, fifteen feet nderground, the bones of a corpse that was thirty feet long, but as almost all decayed; so soon as they handled them they broke pieces; they took up some of the firm pieces, and sent them to e, and I have ordered them to be delivered to your Excellency."[22]

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[22] Weld, Hist. of Royal Soc., London, 1848.

Dutchess County

22, 23 1854 *Poughkeepsie.* Two skeletons, presumably of mastodons, have been found in the vicinity of Poughkeepsie, one in 1854, the other previous to that date. Concerning these finds Doctor Clarke states,[23] " 'A skeleton of a mastodon has been recently discovered buried, in a marsh about 2 miles from Poughkeepsie, New York. Its state of perfection is not known, as it is yet but partly exhumed. This is the second skeleton obtained from the vicinity of this city'. (Am. Jour. Sci., ser. 2, 1854, 18:447.)

" This seems to me to be the same find recently described to me by Prof. W. B. Dwight, who writes: 'The chief find of mastodon bones here occurred 40 or perhaps 45 years ago in a small circular pond (in an unusually dry season I believe) on what is called the Creek road, and from 2 to 3 miles northeasterly from the city. The bones were of large size and were, I think, put into the hands of a library association called the Lyceum. What became of them nobody knows.'

"A vertebra from Poughkeepsie is in the State Museum."

A brief account of the mastodon remains found in 1854 is contained in a letter dated Sing Sing, N. Y., September 22, 1854, written by Spencer F. Baird, former secretary of the Smithsonian Institution, to James Hall. Regarding this occurrence Professor Baird says, " When at Poughkeepsie yesterday morning, I learned that some large bones, supposed to be mastodon, had been discovered in digging marl near the city." A memorandum accompanying the letter states, " that the bones found appear to have been a large vertebra and some splinters of other bones lying in the shelly marl bed. The locality was visited by Professor Baird."

24 1899. *Hyde Park road.* The following account from Poughkeepsie of the remains of a mastodon or mammoth was printed in the New York Herald, of November 20, 1899: " Portions of a mastodon have been found in Dutchess county, in a swamp on the old Macpherson place, in the Hyde Park road, near the country homes of Frederick W. Vanderbilt and other prominent New York persons. Workmen digging a drain found several fragments of heavy bone 15 feet below the surface, and some feet deeper part of a mammoth tusk.

" Mr Edward Storrs Atwater, a wealthy resident of this city, has obtained the bone and will present it to Vassar College. The college officials are desirous of making further excavations in the hope of unearthing the entire skeleton. They also believe other skeletons may be found there."

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[23] N. Y. State Mus. Bul. 69, 1903, p. 927.

The printed article also includes a brief account of the mastodon, found on the Schaeffer farm near Newburg on the opposite side of the Hudson river. The latter find is described under Orange county in this paper.

Genesee County

24 1835? *Stafford.* A mastodon tooth from this place is reported by Hall[24] who states, "In a small muck swamp in Stafford, Genesee county, a small molar tooth was found several years since. Its situation was beneath the muck, and upon a deposit of clay and sand."

25 1841. *LeRoy.* Concerning this find we have only the brief account given by Hall,[25] "In 1841, a molar tooth, weighing 2 pounds, was found in a bed of marl 3 miles south of LeRoy."

26 1897. *Batavia.* In September of this year, some remains of a mastodon were found on the Baker farm about a mile south of Batavia. Accounts of the discovery were published in the Buffalo Express of September 10 and 11th. The animal was identified as the mastodon by Prof. H. L. Ward of Rochester, who visited the locality and saw the parts of the skeleton that were recovered.

One of the tusks of the mastodon was first encountered at a depth of 3 feet in making an excavation which was said to have been in a soil of the nature of quicksand saturated with water. This indicates that the locality was not a true peat bog. The published account also states that "the tusk and rib were found on high land," probably near the margin of a swamp as indicated by the saturated condition of the soil.

Among the other parts recorded as being found was a second tusk of pure cream color found at a depth of about 4 feet. This tusk, probably broken, was about 3¼ feet long and weighed about 32 pounds. It was shorter than the first tusk, which had a length of 5 feet, with a diameter of 5 inches at its larger end and 2½ inches at the point. A portion of a jaw with two teeth, one of which weighed 4½ pounds, was obtained. Some vertebrae, a rib and larger bones, probably leg bones, and part of skull were also uncovered. See Clarke N. Y. State Mus. Bul. 69, 1903, p. 932.

27 1908. *Batavia.* This find is reported by Clarke,[26] who states,

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[24] Nat. Hist. N. Y., Geol. 4th Dist. 1843, p. 364.
[25] Nat. Hist. N. Y., Geol. 4th Dist. 1843, p. 364.
[26] N. Y. State Mus. Bul. 140, 1910, p. 46.

"Discovery of a part of a skeleton on Willow street in this village has been reported. The bones found consisted of a few ribs, vertebrae and leg bones and it is stated that a jaw bearing teeth was also uncovered." Most of the remains are in a splendid state of preservation and are now in the Holland Land Office Museum at Batavia.

28 1916. *South Byron.* About 1916 a molar of a mastodon was found on the farm of Mrs E. H. Miller. The location is a short distance south of the village at an altitude near 700 feet, and 8 miles northeast from the mastodon locality in Batavia village. At the present writing the tooth is in the possession of Mrs Miller.

Greene County

29 1706. *Coxsackie.* This mastodon, whose remains were found some miles below Albany, probably in the town of Coxsackie, was the second found in America. The year before, in 1705, the first specimen found by white settlers had been uncovered at Claverack. It is no wonder then that great curiosity and doubt was expressed as to the kind of animal to which the remains belonged.

Among the manuscripts of Cotton Mather, deposited at one time with the American Antiquarian Society at Worcester, was a letter to him from Governor Joseph Dudley in which an account is given of these mastodon remains from the vicinity of Albany, N. Y. The letter was first printed in the Collections of the Massachusetts Historical Society[27] and later in Eager's History of Orange County. As an early record of mastodon remains from this locality, it is herewith presented in its entirety:

"Roxbury, 10 July, 1706.

"Sir, I was surprised a few days since with a present laid before me from Albany, by two honest Dutchmen, inhabitants of that city, which was a certain tooth accompanied with some other pieces of bone, which being but fragments, without any points whereby they might be determined to what animals they did belong, I could make nothing of them; but the tooth was of the perfect form of the eye tooth of a man, with four prongs or roots, and six distinct faces or flats on the top, a little worn, and all perfectly smoothed with grinding. I suppose all the surgeons in town have seen it, and I am perfectly of opinion it was a human tooth. I measured it, and as it stood upright it was six inches high lacking one-eighth, and round 13 inches, lacking one-eighth, And its weight in the scale was 2 pounds, and four ounces, Troy weight. One[28] of the same growth, but not of equal weight was last year presented to my lord Cornbury, and one of the same figure exactly was shewed at Hartford, of near a pound weight more than this.

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[27] Second ser. 1814: 2:263–64. See also Phil. Trans. Royal Soc. Lond., 1814, 29:62.

"Upon examination of the two Dutchmen they tell me the said tooth and bones were taken up under the bank of the Hudson's river, some miles below the city of Albany, about 50 leagues from the sea, about —— foot below the surface of the earth, in a place where the freshet does every year rake and waste the bank, and that there is a plain discoloration of the ground, for seventy five foot long at least, different from the earth in colour and substance, where is judged by every body that see it, to be the ruins and dust of the body that bore those teeth and bones.

"I am perfectly of opinion that the tooth will agree only to a human body, for whom the flood only could prepare a funeral; and without doubt he waded as long as he could to keep his head above the clouds, but must at length be confounded with all other creatures and the new sediment after the flood gave him the depth we now find.

"I remember to have read somewhere a tradition of the Jewish rabbins, that the issues of those unequal matches between heaven and earth at the beginning were such whose heads reached the clouds, who are, therefore called Nephelim, and their issue were Geborim, who shrunk away to the Raphaim, who were then found not to be invincible, but fell before less men, the sons of the east in several places besides Canaan. I am not perfectly satisfied of what rank or classis this fellow was, but I am sure not of the last, for Goliah was not half so many feet as this was ells long.

"The distance from the sea takes away all pretension of its being a whale or animal of the sea, as well as the figure of the tooth, nor can it be any remains of the elephant, the shape of the tooth and admeasurement of the body in the ground will not allow that.

"There is nothing left but to repair to those antique doctors for his origin, and to allow Dr. Burnet and Dr. Whiston to bury him at the deluge, and, if he were what he shows, he will be seen again at or after the conflagration further to be examined.

"I am, Sir, your humble servant,

"J. DUDLEY."

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[28] This refers to the Claverack specimen.

30 1838? *Greenville.* Both Hall and Mather record in their 1843 reports[29] the finding of bones at Greenville, which were probably those of a mastodon, although Mather remarks that they were "the bones of a fossil elephant, as is supposed." Hall states that "the bones were imbedded in a freshwater marl, or rested upon the clay beneath the marl. There is here no possibility of their having been transported." This locality, which is about 2 miles west of Greenville, was also visited by Sir Charles Lyell[30] in company with Professor Hall in 1841. Lyell states that the remains of a mastodon occurred, "at a depth of 4 or 5 feet, in shell-marl, with recent species of shells. These deposits of marl covered with peat are newer than the boulder (drift) formation." No information is available as to the exact date when the bones were found. According to Mather, "Two of the vertebrae were brought to Albany, one of them, *the dentatus*, is still in the possession of Prof. E. Emmons. The articulating surface of this is 9 inches in diameter." Greenville is at an elevation of around 700 feet, about 12 miles west of the Hudson and 8 miles north of the higher points of the northern Catskills.

31 1840. *Freehold.* From a small swampy depression on the farm of Charles Coonley, located on the road between Freehold and Greenville, bones of a mastodon have been obtained at various times. Doctor Clarke[31] records an atlas found in 1840, and within the last 15 years a few other bones, including one vertebra, have been obtained. A vertebra from this locality is in the American Museum of Natural History, having been presented by Charles Snyder of Freehold. Information given the writers by residents of Freehold and Greenville is to the effect that most of the bones of the mastodon are still in the swampy depression, their presence having been determined, it is said, by sounding. The Freehold locality is about 3 miles from the mastodon find recorded from west of Greenville.

Lewis County

32 1877. *Copenhagen.* Mastodon or mammoth (plate 5, upper figure). Franklin B. Hough of Lowville in a letter, now in the Museum files, to Dr S. B. Woodworth, Secretary of the Regents, under date of September 29, 1877, writes as follows: "Mr P. H.

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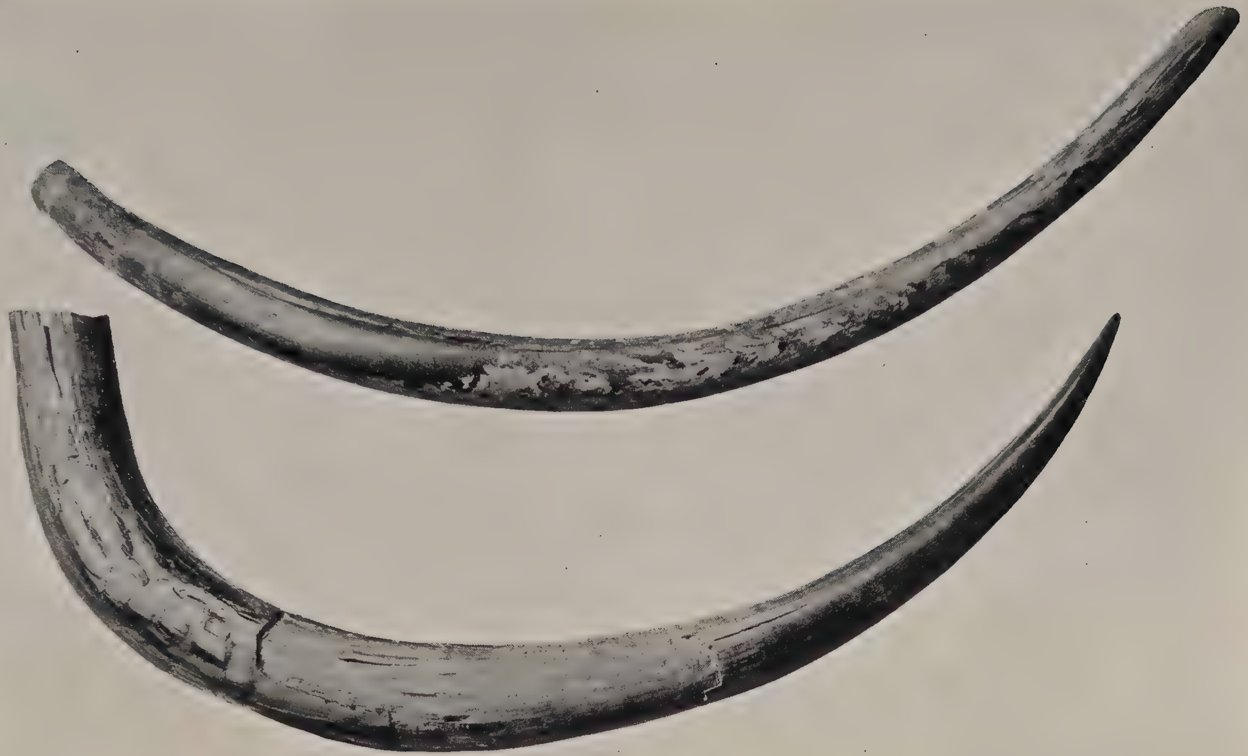
[29] Hall, Geology of New York, pt 4, p. 367; Mather, Geology of New York, pt 1, p. 44.

[30] Lyell's Travels in North America, 1845, 1:54. See also Amer. Journal Sci. 1844, 46: 322.

[31] N. Y. State Mus. Bul. 69, 1903, p. 927.



Upper figure. Slender tusk found at Copenhagen, Lewis co., N. Y. Believed to be a tusk of a female mastodon, but may possibly be that of a mammoth. *Lower figure.* Well-preserved tusk of a young mastodon from Harriman, N. Y.

Sage of Copenhagen, Lewis Co., has just brought to me a tusk of a Mammoth or Elephant[32] found about a mile west of that village on Thursday of last week (Sept. 20th). It is 5 feet 9 inches long on the lower side, 8¾ inches around at the base and 10¾ at the largest part, and weighs 25 pounds. It was found in digging muck from a low place in a field that had no drainage but was on somewhat elevated ground. Its base was uppermost in the muck and it passed obliquely down through a kind of marl into a bed of blue gravel. The tip was broken off in getting out but has been mended on again. The tusk is quite sound and has a socket at the base. . . . The tusk is much more slender than any I have seen, and must have belonged to a young animal." In a letter to Professor Hall, dated October 11, 1877, Doctor Hough tells of a personal visit to the locality. He wrote, "The place where the tusk was found being 12 miles from this place, I did not find an opportunity of seeing it until today. The spot is a narrow swamp timbered with black ash, soft maple and elm, and was evidently once a shallow pond. The limestone rock is not over 10 or 12 feet below the surface, and is covered with a foot or more of gravel. Over this is a stratum of marl, still showing occasionally delicate but distinct shells of existing species but mostly a finely comminuted greyish white mass of the consistence of putty. Above this and varying in depth from 1 to 6 feet or more, is muck, full of the remains of the recent vegetation of the swamp. The place where the tusk was found, was near the bottom of the muck, and in the marl, about 5 feet below the surface. No excavatioins have since been made and the hole is now in the condition of a mortar bed from recent rains.

"I think there is no doubt but that the animal lost its life there as both the marl and muck have been formed where they are. There is no appearance of any materials having been transported by currents or otherwise."

This swamp is on the divide between the North Sandy creek and the Deer river at an elevation of 1190 feet above sea. A slight difference in level would turn the waters into the Deer river, but the natural overflow is into the extreme source of the North Sandy creek. This find is the most northerly thus far recorded in the State. The tusk as shown in the plate is a slender one and it has not been determined definitely whether it belonged to a mastodon or mammoth. While the tusk resembles in some respects that of the mammoth it is quite likely that it belonged to a female mastodon. The character of the tusk and the nature of the deposits in which it was found are quite similar to those of the Mount Holly, Vermont, mammoth[33] (E. primigenius), which was found on the divide between the Champlain and Connecticut valleys, beneath muck and lying on a bed of gravel at an elevation of 1415 feet. One of the Mount Holly tusks had the following measurements: along curve on outer surface 80 inches, greatest circumference 12 inches, cord from base to point 60 inches, longest perpendicular from cord to inner curve 19 inches. In the Copenhagen specimen the corresponding last two measurements are 50 and 13 inches respectively. The measurements show that the Mount Holly specimen is larger than the Copenhagen, and that the proportions are nearly the same. It is not known whether the curve of the Mount Holly tusk is in a single plane. The Copenhagen specimen clearly shows a spiral curve.

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[32] A brief account of this find is given by C. H. Merriam in "The Mammals of the Adirondack Region," 1886, p. 145. The same account is also given in Tran. Linnaean Soc. of N. Y., 1884, 2:47.

Livingston County

33 1825. *Geneseo.* In 1825, the remains of a mastodon were found about one-half mile east of the court house at Geneseo in a small marsh. An account of the find was published in the Livingston Register of August 17, 1825, and 2 years later the following article was written by Jeremiah Van Rensselaer:[34] "The tusks were first seen, and then the head, but these, as indeed the whole skeleton, were in such a state of almost total decomposition, as to defy all attempts at preservation. The skeleton lay in the direction so frequently observed in the remains of this animal, South West and North East. The head rested upon the lower jaw. The tusks were much decayed; their points were five feet apart, and curved at least a foot from the center. They were four feet and two inches in length; the largest diameter could not be ascertained on account of their decay — but it was preserved a considerable distance and then gradually diminished, so that at five inches from the point, the diameter was three inches. The laminated structure of the tusk was rendered evident by decomposition, which had in a measure separated the laminae, and the whole was supposed to be phosphate of lime.

" Of the two (superior) incisors, no trace could be discovered, but the eight molars were in situ. The length of the largest tooth was six and a quarter inches; of the smallest three and a half; the crown of the tooth was two and a half; and the breadth of the enamel from one-eighth to three-eighths of an inch, as was rendered visible by wearing away of the surface. The roots were all broken and decayed. The animal could not have been old, as eight molar teeth were found; old animals have only one molar on either side of each jaw.

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[33] Appendix to Thompson's Vermont, 1853, p. 15.

[34] Amer. Jour. Sci., 1827, 12:330-81.

"The pelvis was twenty two inches in its transverse diameter, between the acetabula at the inferior opening. The epiphyses of the large bones, and the patellae were found nearly perfect, not having suffered from decay."

This find is mentioned by DeKay,[35] who states that the skeleton was found resting upon a bed of fine white gravel, but as DeKay refers to the Rensselaer account, which is apparently the source of his information, the word marl should have been used instead of gravel.

One of the teeth of the Geneseo mastodon is figured by Hall[36] whose brief account is here given:

"At Geneseo in Livingston county, several years since, a large number of bones and three teeth were found in a swamp beneath a deposit of muck, intermingled with a sandy calcareous marl. A single tooth, in the possession of C. H. Bryan, Esq. of Geneseo, is the only known remaining specimen of this collection. The figure at the head of the chapter is from this fossil."

Hall further states (p. 366), "In the case at Geneseo, where the bones were said to be imbedded in gravel, it is proved to have been a shell marl."

A footnote on the same page reads; "While Mr. Lyell was in this part of the country, being desirous to ascertain the truth among conflicting statements, he procured an excavation to be made at the spot where the bones were originally found. Some fragments of bones were obtained, mixed with marl and freshwater shells, leaving no doubt of the position of the animal, which doubtless perished on the spot where these remains occur."

Sir Charles Lyell's account of his visit to the Geneseo locality is given in his "Travels in North America" (1845, 1:45):

"I was desirous of knowing whether any shells accompanied the bones, and whether they were recent species. Mr. Hall and I therefore procured workmen, who were soon joined by several amateurs of Geneseo, and a pit was dug to the depth of about five feet from the surface. Here we came down upon a bed of white shell-marl and sand, in which lay portions of the skull, ivory tusk, and vertebrae, of the extinct quadruped. The shells proved to be all of existing freshwater and land species now common in this district. I had been told that the Mastodon's teeth were taken out of *muck*, or the black superficial peaty earth of this bog. I was therefore glad to ascertain that it was really buried in the shell-marl below the peat, and therefore agreed in situation with the large fossil elks of Ireland, which, though often said to occur in peat, are in fact met with in subjacent beds of marl."

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[35] Nat. Hist. N. Y. Zool., pt 1, 1842, p. 104.

[36] Nat. Hist. N. Y., Geol. pt 4, 1843, p. 364; fig. 173, p. 363: tables; no. 68, fig. 74. See also Amer. Jour. Agr. & Sci., 1847, 6:35, fig. 2.

Another account by Lyell,[37] published previously to the one above given states that at Geneseo (printed Genesee), " Remains of the Mastodon giganteum were found with existing shells in a small swamp, in a cavity of the boulder formation, so that the animal must have sunk after the period of the drift, when a shallow pond fed by springs was inhabited by the same species of fresh-water Mollusca as now live on the spot."

A somewhat extended account of the Geneseo mastodon is given in "A History of Livingston county."[38] From this history the following statements are derived: " The tusks were of spiral form, one measured 5 feet in length and 7 inches in diameter at its base, gradually diminishing in size to an obtuse point. They were found about 3 feet apart, their points lying in opposite directions. The teeth were marked upon their grinding surface by four rows of studded, blunt points elevated an inch. The processes of the teeth that enter the jaw were destroyed in all of them. The bones were so badly decayed that it was impossible to collect any of the important ones. Measurements showed that the lower bone of the hind leg was 3 feet in length from the knee joint to the ankle. The thigh bone was 3 feet in length from joint to neck. The length of the animal from the center between the base of the two tusks to the exterior point of the pelvis was estimated at 20 feet and the height at 12 feet. The bones were placed in the cabinet of the Buffalo Natural Historical Society."

This society is now the Buffalo Society of Natural Sciences. Its museum contains five molar teeth and parts of tusks from western New York and probably belong to the Geneseo specimen. The molar from Geneseo figured by Hall, shows the root processes. It is not known whether this specimen has been preserved. It may have represented the best of the molars or the processes may have been added when making the drawing. The early accounts stated that the root processes were all broken and decayed.

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[37] Am. Jour. Sci., 1844, 46:322. This article is from the Proceedings of the London Geological Society, 1843, v. 4, no. 92.

[38] By Lockwood L. Doty, Geneseo, 1876, p. 379–81. On page 528 is the statement that the Mammoth spring at Geneseo is so called from the fact that several bones and teeth of a mastodon were exhumed here in 1825.

34 1886. *Fowlerville.* Some remains of a mastodon were found in an excavation on the bank of the Genesee river, 80 feet above the water. Three or four teeth, tusks and some badly broken bones were found.[39] Some of the teeth are said to be in a private collection in Rochester.

35 1835. *Scottsburg.* An account of the finding of this specimen is given in "A History of Livingston County" (1876, p. 380). The account states that the "discovery was made about the year 1835, in straightening the road from Scottsburgh to Conesus lake. In digging the ditch on the east side of the road, where it ran through a swamp of five or six acres, near the inlet of the lake and about thirty rods to the west, the remains of a mastodon were found, about three feet below the surface. Eight teeth were found, four of which had blunt points, and weighing about two pounds each. The shoulder blades, pieces of the ribs and some joints of the backbone were also found. Some of these bones are now in the Le Roy Female Seminary." Clarke[40] states on the authority of C. E. Beecher that twenty bones and fragments were collected by F. H. Bradley and H. A. Green, which were presented to Yale University Museum by R. S. Fellows. There is a possibility that the record presented above may actually represent two finds in the vicinity of Scottsburg. Data to determine this point are not available.

36 1900? *Nunda.* It is not known whether this find represents a mastodon or mammoth. The only account we have of the bones is the brief statement of Clarke[41] which reads, "Ten bones and fragments, collected by Rev. Milton Waldo and presented by R. S. Fellows to Yale University Museum, *C. E. Beecher.*" As no account of the find is given in the History of Livingston County published in 1876, the bones were probably collected between that date and 1900.

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[39] N. Y. State Mus. Bul. 69, 1903, p. 932.
[40] N. Y. State Mus. Bul. 69, 1903, p. 932.
[41] N. Y. State Mus. Bul. 69, 1903, p. 932.

Madison County

37 1917. *Canastota.* The discovery of these remains was reported by Dr Burnett Smith, of Syracuse University, and a brief account of the find was published by Doctor Clarke (N. Y. State Mus. Bul. 196, p. 46, 1918). The bones were found in 1917 at an elevation of 420 feet while a drainage ditch was being dug in muck on the farm then owned by Mrs J. B. Fuller, 4 miles north from Canastota and 2½ miles south from Lewis point on the south shore of Oneida lake, which is 123 feet above the level of Lake Ontario and within the limits of glacial Lake Iroquois. The parts found consisted of femur, ulna, radius, tibia, patella and three ribs. A photograph of the larger leg bones was shown to Dr W. D. Matthew and by him identified as those of a mastodon. The bones were all found close together, in muck at a depth not exceeding 3 feet from the surface. Efforts to obtain the bones for the Museum were unavailing as the owners hoped to procure the remaining ones for assembling a complete skeleton. Difficulties encountered with water gave but little encouragement to hopes for final success of the enterprise. The locality for this mastodon is less than 3 miles from the place, and at nearly the same elevation, where an incisor of the giant beaver[42] was found. This mastodon find is of special interest because the remains occurred well within the basin of glacial Lake Iroquois, thus indicating the presence of the living mastodon in this section after the withdrawal of glacial waters and the extinction of Lake Iroquois. At this time the glacier also had retreated far enough to the north to again establish the St Lawrence drainage.

Monroe County

38 1813?, 1830, 1833. *Perinton.* In a letter, to the editor of the American Journal of Science and Arts, dated Pittsford, October 26, 1830, J. A. Guernsey states:

> I have just procured a piece of a tusk found 3 weeks since in the bank of the Irondequoit creek, 2½ miles from this place; a boy struck a spade against the point of the tusk and broke it off, he then dug parallel to the surface of the earth, about 5 feet below the sod, but he broke it into five pieces. The entire length of all the pieces was 7½ feet, and the whole tusk must have measured 9 feet The exposure to the air causing it to slack and crumble, I advised the possessor to lay it in a box of sand where it now remains.
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> The root or butt of the tusk is hollow for 18 inches. The longest piece measures 22 inches in length, and 16½ inches in circumference, weighing

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[42] See article by Burnett Smith (Am. Jour. Sci., Nov. 1914) for detailed account of the incisor and descriptions of the Pleistocene formations of the region.

22 pounds. The weight of the whole was, when I first saw it, 57 pounds and 8 ounces.

P. S. One of the vertebrae of the neck was also found, weighing 2 pounds 2 ounces; it was apparently very much decayed. The owner of the lands intends digging for the remainder of the skeleton. A. J. S., 1830 (1831) 19:358.

With the above published description there is a sketch of the tusk and the statement is made that it was drawn from memory.

Six years after the publication of the above account, an article, written at Rochester, describing another find was published[43] under the title, "Fossil Remains of the Elephant, Elephas primigeneus." The locality is undoubtedly the same as that of the 1830 find since both are at the Irondequoit creek and the same distance from Pittsford. Fullam's Basin, the locality for the later find, is just west of Fairport near the place where the West Shore Railroad crosses Irondequoit creek. The 1837 account includes these statements:

> These fossil remains were dug up from a sand bank in the Irondiquot creek in the town of Perinton, about 10 miles east of this city. They consist of a *tusk* and *two teeth* of the fossil elephant. The teeth are well preserved. The tusk had decayed for some distance at each end. As it lay in the sand, curved somewhat, it measured 10 *feet* in length, and *7 feet* of it were removed, but a portion of this length broke into many pieces. The longest piece is *2½ feet long,* and 5 inches in diameter, and as it belonged near the middle part of the tusk, the whole was of great size and near the root was probably 8 inches in diameter. The large piece and many fragments are now in the possession of Mr Butler,[43a] the enterprising proprietor of the museum in this city.
>
> These fossils were found April 2, 1833, in excavating the earth for the passage of water at a saw-mill. It is said that there was no indications of other bones or teeth. About *20* years before, a *thigh bone* of some huge animal was found in removing the earth a few rods below in the same bank. The whole probably belonged to the same animal, and more may yet be discovered on further removal of the earth. The *thigh bone* is said to be in the possession of a gentleman in an adjoining town to Perinton, but I have not been able to discover it. The tusk lay about *4 feet* below the surface, and partly under the stump of a large forest tree. The place was covered with forest a few years ago; I have conversed with several individuals who were at the place, and knew the circumstances, and have examined the remains in the museum. There can be no doubt about the character of these remains and that they had been buried for centuries in the earth. The place is in the road, at the Irondiquot creek, a little distance from the place called *Fullum's Basin,* perhaps 10 miles from Lake Ontario.

The thigh bone mentioned as having been found about 20 years before, which would make the date about 1813, seems not to have been known to Mr Guernsey, and no mention is made of Guernsey's letter in the 1837 article.

In a footnote in the American Journal of Science (1838, 33:123) Prof. C. Dewey states, "The remains of the elephant in the museum of Mr. Bishop, noticed in the last number of this Journal, belong to one species of the mastodon. The teeth of the elephant were from some place, it is said, in Ohio. Those of the mastodon were found with the tusk in Perinton, as described."

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[43] Am. Jour. Sci., 1837, 32:377.

[43a] Should probably read "Mr Bishop."

It is evident from Dewey's statement that the remains at Perinton were those of a mastodon, and his statement finds substantiation in "Sketches of Rochester" by Henry O'Reilly, published at Rochester in 1838, which has the following account of the Rochester Museum (p. 381), "The proprietor is J. R. Bishop. Some small remains of the mastodon, found in Perinton, in Rochester, and on the western prairies, may be seen in this collection."

The Perinton fossil remains are also described by O'Reilly as follows:

> It was on the bank of this stream [Irondequoit], near Fullam's Basin, in the town of Perrinton, that the thigh bone, one large tusk, and two teeth of the fossil elephant, mastodon, were found in the diluvium, over which stood the aged trees of an ancient forest. A part of these remains are now to be seen in the Rochester Museum kept by Mr Bishop. The discovery was made by Mr Wm. Mann while digging up a stump. The teeth were deposited about 4 feet below the surface of the earth. These were in a tolerably good state of preservation; the roots began to crumple a little on exposure, but the enamel of the teeth was in almost a perfect state.

Under the heading "American Elephant," DeKay[44] in 1842, described what he considered to be a new species of fossil elephant (Elephas americanus). He states that the specimens "were found in a diluvial formation near the Irondiquoit river in Monroe county, 10 miles east of the city of Rochester. According to a writer in the American Journal [of Science], volume 32, page 377, these remains consisted of a tusk and two molars, one of which is in the Cabinet of the Lyceum (New York) and is that figured in the plate." On the basis of Dewey's statement, it seems reasonable to assume that the tooth figured by DeKay, may represent a find from without the State, or if from the State it was not from the Perinton locality. Possibly the tooth may have been obtained from Bishop's Museum at Rochester, which had mammoth teeth among its collections. At least it is not clear how the tooth figured by DeKay, came to be recorded from Perinton. Further reference to this tooth will be given under mammoths (page 70). It may be here remarked that among the mastodon localities given by DeKay he lists (page 104) "Perrinton, near Rochester, Monroe county." Hall[45] throws no further light on the character of these remain and apparently no mammoths from New York were known to him at the time of the publication of his report in 1843. Among the list of Fossil Bones of Quadrupeds he cites one (page 364): "in the town of Perrinton, in the bank of a small stream, in gravel and sand, a tusk and several teeth were found at this place, which are now in the Rochester Museum."

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[44] Nat. Hist. N. Y.; Zool. 1842, pt 1, p. 101; pl. 32, fig. 2.
[45] Nat. Hist. N. Y., Geol., pt 4, 1843, p. 364.

The evidence as to the age of the deposits in which the remains were found is not such as to justify any definite conclusion. Whether the animal became imbedded in these deposits while Iroquois waters were still present or at a much later period can not be determined from present known facts. Hall states that "the deposit of gravel and sand is a recent one, made by the stream on which it occurs" (page 366). It is possible that the remains may have been washed out of an earlier deposit by later waters and some of the parts reinterred. The scattering of the remains suggests that such might have been the case. The bulk of deposits are of glacial delta formation and the locality is not only within the southern area of glacial Lake Iroquois but also in the area of the preceding water, glacial Lake Dawson.

39 1837. *Genesee Valley Canal.* Mastodon or mammoth. A letter apparently written by Prof. Chester Dewey and dated Rochester August 19, 1837 states[46]:

> A part of a mammoth has this day (Aug. 19th) been uncovered in excavating the Genesee Valley Canal, where it crosses Sophia[47] street, in this city. Two ribs, a part of the skull, and of a bone of a leg, and an enormous tusk, have been found. The last, which must have been 8 or 10 feet long, was chiefly picked to pieces by the Irish laborers, who supposed it to be a log, as it had lost its gelatine; about a foot of the smaller end is entire, and there can be no doubt what it once was. It must have been 8 inches in diameter in the middle. One rib, which seems to have been a short rib, is in a fine state of preservation. Whether the animal was an elephant or a mastodon is uncertain. These remains were found about 4 feet below the surface in a hollow or water-course, lying on and in a very hard body of blue clay, and about 2 feet above the polished limestone, which underlies so great a portion of this city.
>
> The upper surface of the limestone, which is covered with soil and earth from 2 to 6 and sometimes to 12 and 20 feet deep under Rochester, is not merely smoothed, but actually polished, making a very good transition marble.

This find is also recorded by Hall in Assembly Document 200, February 20, 1838, page 347, and more fully described by him in the Natural History of New York (Geol. pt 4, 1843, p. 364). Hall states, "In 1838 [should be 1837], . . . some bones of the head, several ribs, parts of two vertebrae, and some portion of the pelvis were found, intermingled with gravel and covered by clay and loam, and above these a deposit of shell marl. These bones are now in the state collection. The tusk is said to have been nine feet long, but was nearly destroyed by the workmen before removing it from the clay. A portion of a tibia was also found, which is in the Rochester Museum."

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[46] Amer. Jour. Sci., 1838, 33:201.

[47] This is now Plymouth avenue and the locality is near its intersection with Caledonia avenue.

Sir Charles Lyell[48] during his travels in America in 1841, visited the above locality. He writes, "In the suburbs of Rochester, Mr Hall and I visited a spot where the remains of the great mastodon had been dug up from a bed of white shell-marl. I found fragments of the fossil teeth and ivory of one tusk, and ascertained that the accompanying shells were of recent species of the genera Limnea, Planorbis, Valvata, Cyclas, etc."

In the report of DeKay (1842), no mention is made by name of the Sophia street (Rochester) find. The following, however, occurs on page 103: "In the same year (meaning 1817), remains were found in the city of Rochester, 4 feet below the surface, in a hollow or watercourse." It is evident on comparing the above sentence with the August 19th letter of Professor Dewey, that DeKay's statement refers to the Sophia street discovery and that the date should have been 1837 instead of 1817. On the basis of DeKay's published statement, Hall in 1843 (page 364) lists finds for the two years 1817 and 1838, which are here combined under the date 1837.

40 1866? *Mt Hope cemetery.* "A few remains at Mount Hope cemetery, H. L. Ward."[49] This is all the information we have concerning this find, and it is not known whether any of these bones were ever collected. It is possible that the bones were too fragmentary and probably not well preserved as only a few were found and it is not known whether the bones belonged to a mastodon or a mammoth. The locality is on the east side of the Genesee river, the cemetery being in line with the southwestern extension of the Pinnacle hills and apparently having a similar glacial origin, the deposits being composed of sand and gravel. The site is less than a mile from the Genesee Valley canal find of 1837.

41 1913. *Charlotte Boulevard, Rochester.* In the geological museum of the University of Rochester there is a rib of a mastodon

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[48] Travels in North America, 1:18, 1845. See also Lyell's article in Proceedings of the London Geological Society, v. 4, no. 92. This article is also printed in Amer. Jour. Sci. v. 46, 1844; see p. 322 for reference to the Rochester locality.

[49] Clarke, N. Y. State Mus. Bul. 69, 1903, p. 931.

or mammoth found 12 feet below the surface of the ground in gravel at the corner of Charlotte boulevard and Miller street, Rochester. The specimen was presented by Sigurd Bo in January, 1913, having been found but a short time previously. No other remains are believed to have been present in the immediate vicinity, at least no others were found, and we are with no clue for the generic determination of the specimen. The above information was given by Prof. G. H. Chadwick to one of the writers when he visited the Rochester Museum a few years ago.

42 1918. *Pittsford.* Prof. H. L. Fairchild has recently reported the discovery of the foot bones of a mastodon or mammoth in a small swamp near Pittsford in which there is marl overlaid by muck. It is intended to carry on excavations in hopes of obtaining other parts of the animal.

New York County

43 1840? *Manhattan.* The following account of a find, supposedly that of a mastodon, in New York City is quoted from Issachar Cozzens, in "A Geological History of the New York or Manhattan Island," published in 1843 (page 75): "The cellular part of a large bone, probably of the mastodon, was found in digging the cellar of J. M. Bradhurst's house about 10 feet below the present surface, in Broadway near Franklin street."

44 1885. *Inwood.* Mastodon or mammoth. Of this tusk Prof. R. P. Whitfield[50] writes as follows: "In April 1885, Elisha A. Howland, then principal of grammar school No. 68, at 128th street, between Sixth and Seventh avenues, brought and donated to the museum the lower extremity of a mastodon tusk, nearly 15 inches long by 4 in its greatest diameter, which had been found shortly before at Inwood, N. Y., while cutting a ditch through a peat bed near the Presbyterian Church at that place. This fragment shows fresh breaking at the upper end, and was undoubtedly much longer when first found."

45 1885. *Dyckman's creek.* Mastodon or mammoth. In 1885 a tusk was found in excavating for the Harlem ship canal. An account of this find as communicated to Science[51] by R. P. Whitfield of the American Museum of Natural History includes the following statements:

> The specimen was found at a depth of 16 feet below mean low water, at the eastern end of Dyckman's creek, at its junction with the Harlem river.
> The portion of the tusk preserved and received at the museum is nearly

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[50] Science, v. 18, Dec. 18, 1891.

[51] V. 18, Dec. 18, 1891.

3 feet long, and has a diameter of 7½ inches full, at its largest part; being the upper or socket end of the tusk, and is well preserved, although much shattered by drying and rough handling by the workmen before it came to the attention of the engineers in charge of the work.

The excavation at this point is through the salt meadow of the Harlem river, showing from 4 to 6 feet of meadow sod and silt filled with the roots of the meadow grass; below this there is a deep bed of incipient peat, of which, at the spot where the tusk was found, there was fully 12 feet; next below comes a bed of sandy clay of very variable thickness, but at the spot in question measuring only 18 or 20 inches in thickness. This clay rests immediately on the submerged slope of the dolomitic limestone ridge which forms the upper end of Manhattan island, and extends northward beyond the Spuyten Duyvil creek.

The tusk was found imbedded in the peat with the socket or " butt " end down, and slightly entering the sand, the shaft being in the peat and at an angle of about 70 degrees to the horizontal, showing that it had settled through the peat until it came in contact with the sand.

From the indications furnished by the conditions of its occurrence I should conclude that the tusk had not been transported from any other locality after the death of the animal, as there is no abrasion shown on its surface. Moreover, the peat in which it was imbedded is in the condition of its original formation, is clean and unmixed with any foreign matter, being entirely of vegetable origin: and contains quantities of seeds, apparently of Carices, or sedges, and grasses, as well as a few nutlets of some bush or shrub not yet determined, and examples of the elytra of beetles. At the top of the peat occur numbers of the stumps and roots of forest trees and fragments of wood. No evidence whatever is found of any marine substance below the roots of marsh grass, not a vestige of any kind of mollusks, marine or fresh water, can be detected, although now living and abundant in the salt waters at the surface. The sandy clay between the peat and the surface of the limestone appears to me to be the result, principally, of the decomposition of the limestone in place, and not transported sand. Glacial markings are discoverable on the surface of the limestone a short distance south of the locality, where the soil has protected it from the action of the weather, but where the ledge has been uncovered by the removal of the peat and sand, it shows a deeply rotted surface covered by the sand.

Dyckman's creek was an artificially excavated channel, made about 1818, for the purposes of a tide mill, through a natural depression at that point, and not a natural stream; consequently, it could have had no agency in the transportation of the tusk; and it seems probable that the animal to which the tusk once belonged either died near the spot, or by some accidental injury had it broken from its socket near where it was found.

The exact location of its occurrence is in the canal, about 15 feet from its northern side, and about 10 feet west of the center of Broadway.

Niagara County

46 1840? *Niagara Falls.* Both Hall and Lyell mention the finding of mastodon remains at Niagara Falls. Hall[51a] states: "A molar tooth was found in digging a mill-race at Niagara falls, several feet below the surface. The deposit in which it occurs is a fine gravel and loam containing fresh-water shells, and is evidently a fluviatile deposit." Hall further adds (page 396) that the place was " upon the east side of the river, of the same elevation as Goat Island. It was at this place, and in the same deposit, that a mastodon's tooth was found 11 feet below the surface." Lyell,[52] who visited the locality in company with Hall, gives a more extended account and has a figure which indicates the place where the remains were found on the mainland opposite Goat island.[53] Lyell's account follows:

[51a] Nat. Hist. N. Y. Geology, pt 4, 1843, p. 364, 396.

> We began by collecting in Goat island shells[54] of the genera Unio, Cyclas, Melania, Valvata, Limnea, Planorbis, and Helix, all of recent species, in the superficial deposit. They form regular beds, and numerous individuals of the unio and Cyclas have both their valves united. We then found the same formation exactly opposite to the falls on the top of the cliff on the American side, where two river terraces, one 12 and the other 24 feet above the Niagara, have been cut in the modern deposits. In these we observed the same fossil shells as in Goat Island, and learnt that the teeth and other remains of a mastodon, some of which were shown us, had been found 13 feet below the surface of the soil. We were then taken by our guide to a spot farther north, where similar gravel and sand with fluviatile shells occurred near the edge of the cliff overhanging the ravine, resting on the solid limestone. It was about half a mile below the principal fall, and extended at some points 300 yards inland, but no farther, for it was then bounded by the bank of more ancient drift. This deposit previsely occupies the place which the ancient bed and alluvial plain of the Niagara would naturally have filled, if the river once extended farther northwards, at a level sufficiently high to cover the greater part of Goat island. At that period the ravine could not have existed, and there must have been a barrier, several miles lower down, at or near the whirlpool.

A more recent account of the gravels at Niagara Falls and their age, together with many interesting observations relative to the wearing back of the Niagara gorge since the gravels were deposited, is given by Kindle and Taylor in the Niagara Folio (U. S. G. S. no. 190, 1913). Brief extracts from this folio follow: "While the falls were still below the whirlpool the river above that point was flowing in a shallow bed, like that in which it now flows from Buffalo to Chippewa. This bed was cut mainly in drift, and in the cutting process the fine material was washed out and carried away and the gravel was formed into bars. There are not many such formations in the old bed of the river, but some very small ones are well known through the fossil shells that have been found in them. . . . Much the largest of the gravel deposits connected with Niagara river are those on Goat island and in Prospect Park and the city of Niagara Falls, N. Y. (page 14). . . . Until the falls had cut the gorge back to the vicinity of Swift Drift point, about 1000 feet north of Hubbard point (nearly 2 miles below Goat island) the bed of the river south of that place remained at the level of the gravel on Goat island (page 22.)"

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[52] Travels in North America, 1845, 1:29, fig. p. 30.

[53] This find is apparently the one to which DeKay refers when he states, "A tooth was found in digging a mill-race on Goat island, Niagara county, 12 or 13 feet below the surface." Nat. Hist. N. Y. Zool., pt 1, p. 104, 1842.

[54] See "Post-Pliocene Fossils of the Niagara River Gravels," by Elizabeth J. Letson, N. Y. State Mus. Bul. 45, 1901, p. 238–52.

The evidence presented above shows that the gravels in which the mastodon remains were found were deposited when the falls were nearly 2 miles farther down stream. The time required for excavating this upper section of Niagara gorge gives some basis for estimation of the time since the bones were imbedded in the gravels. The estimate for the time required to cut the Upper Great gorge (about 2¼ miles) has been given as a minimum of 3000 years and a maximum of more than 20,000 years, so that it may not be an exaggeration to say that the mastodon whose tooth was found at Niagara Falls lived 15,000 years ago.

Ontario County

47 1885. *Seneca.* These remains were found at Seneca Castle in the town of Seneca, 6 miles northwest from Geneva. The exact elevation at which the bones were found is not available, but Seneca Castle is at an elevation of 762 feet and the bones must have been obtained somewhere near this altitude. An account of the discovery of these bones was communicated to Science by Prof. E. Hitchcock[55] in 1885. A later account by Clarke[56] is as follows: "Excavated by Henry J. Peck on farm of Charles Gregory, where the bones had been discovered about 1882. Found beneath marl and diatom earth, about 3 feet from the surface. Sixty-five bones were obtained, mostly ribs and vertebrae with one tusk, 9 feet on outer curve, and styloid 1 inch longer than in the Warren mastodon. The antler of an elk was also found. The bones are now in the collection of Amherst College. *H. J. Peck*"

Accompanying the above account by Clarke, is a plate with scale showing the distribution of the bones and a section of the bedded deposits of the swamp.

48 1908. *Manchester.* All the knowledge that we have concerning this find is that a tooth[57] was found on the property of Leonard S. Lyke in the year given.

Orange County

49 1780. *Montgomery* (3 miles south). The earliest definite record of Orange county mastodon remains is given by the Rev. Robert Annan[58] in an article entitled, "Account of a Skeleton of a

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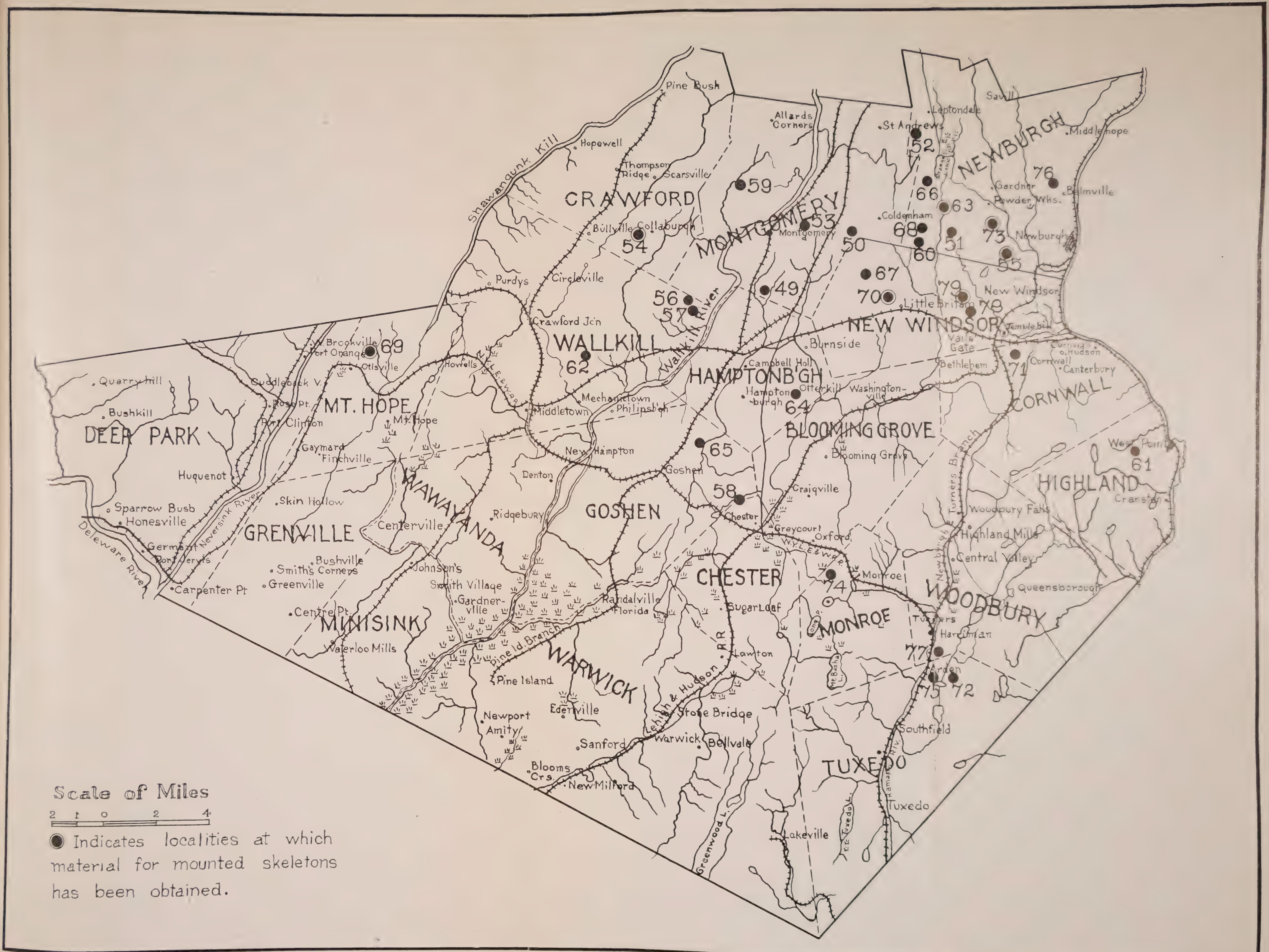
[55] Science, 1885, 6:450.
[56] N. Y. State Mus. Bul. 69, 1903, p. 931.
[57] Clarke, N. Y. State Mus. Bul. 140, 1910, p. 46.
[58] Amer. Acad. Arts and Sci. Mem. 1793, 2:160-64.

Plate 6



Map of Orange county showing distribution of mastodon remains.

Large Animal, found near Hudson's River." Bones and teeth were found in the fall of 1780 during ditching operations intended to drain a deep swamp on the Annan farm, located on the banks of the Wallkill river about 15 miles west of the Hudson.

A considerable part of the skeleton was unearthed, including vertebrae, leg bones and four teeth, the descriptions of which give undoubted evidence of the identity of the animal. The remains were examined by Gen. George Washington while he was encamped at Newburgh in 1782-83 after which some of the bones were carried to Germany by Doctor Michaelis, physician general of the Hessian troops; other bones were sent to a museum in Philadelphia.

The locality of the Annan farm has been given more definitely by other writers as being 3 miles south of Ward's Bridge[59] in the town of Montgomery.

Dr Johann David Schoepf,[60] writing of travels made in America during 1783–84, mentions a tooth from Ulster county. This very likely came from the Annan farm, then probably in Ulster county but annexed to Orange in 1798 when five towns were added.

Under the date of September 10, 1800, Dr James G. Graham, writing to Doctor Mitchill, proprietor of the Medical Repository, said the bones were found in 1782, and later writers have perpetuated the error[61].

Graham (ibid) listed additional Orange county remains, found between 1782 and 1794, giving the localities of them in terms of miles from Ward's Bridge (Montgomery) as follows:

50 *Montgomery* (3 miles east). "About 3 miles east of Ward's Bridge, some other bones were found."

51 *Montgomery* (7 miles east). "About 7 miles east of said bridge, a tooth (one of the grinders), and some hair, about 3 inches long, of a dark dun color, were found by Mr Alexander Colden, 4 or 5 foot below the surface." Sylvanus Miller, in a letter addressed to De Witt Clinton in 1814, mentions specimens of mastodons from Ulster and Orange counties with which were found, "locks and tufts of hair, in tolerable preservation."[62] It is probable that Miller referred to the remains above noticed.

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[59] The village of Montgomery, which was incorporated in 1810, was, prior to that date, known as Ward's Bridge.

[60] Reise durch einige der mittlern und südlichen vereinigten nordamerikanischen Staaten, 1788, 1:413.

[61] Medical Repository, 1801, 4:213–14.

[62] De Witt Clinton, An Introductory Discourse Delivered before the Literary and Philosophical Society of New York, on the Fourth of May 1814. New York, 1815.

52 *Montgomery* (7 miles northeast). "About 7 miles northeasterly from Ward's Bridge, a vertebra was found."

The Peale Skeletons

53 1793-1801. *Montgomery* (1 mile east). Graham (ibid) stated that in 1793, three or four ribs of the mastodon were found 1 mile east of Ward's Bridge at a depth of 8 feet below the surface. This was one of three localities to be exploited in 1801 by Charles Wilson Peale, who succeeded in recovering sufficient material to partially restore two skeletons.

Rembrandt Peale,[63] in the account of the exertions of his father, gives this locality as being 11 miles from Newburgh on the farm of Captain J. Barber: "Almost an entire set of ribs were found, lying nearly together, and very entire; but as none of the back bones were found near them (a sufficient proof of their having been scattered) our latitude for search was extended to very uncertain limits. . . ." Excavations carried on for 2 weeks resulted in finding ". . . two rotten tusks, three or four small grinders, a few vertebrae of the back and tail, a broken scapula, some toe-bones, and the ribs, found between 4 and 7 feet deep." Eager[64] states incorrectly that the Peale excavations were carried on in 1805 or 1806.

Peale's Baltimore Skeleton

54 1794-1798-1801. *Montgomery* (5 miles west). Five miles westerly from Ward's Bridge a number of bones were taken up in 1794 and sent by Graham to New York where they were said to have been deposited in Columbia college (Graham, ibid). In 1798 other bones were found in the same locality and secured by Peter Millspaw, on whose farm the bog was situated. Peale carried on further excavations in 1801 and secured the first specimen of a complete under jaw. Altogether Peale succeeded in unearthing some ribs, toe and leg bones, the right scapula, the atlas and part of the head; to these were added bones that had been in the possession of Doctor Graham and Doctor Post, consisting of a rib, the sternum, a femur, tibia and fibula, and a patella. Another rib was found in a farm house some 10 miles distant (Peale, ibid).

These remains, together with restorations made from bones discovered in other localities, were assembled and exhibited for a number of years in the Baltimore Anatomical Museum.[65] The skeleton was disarticulated and purchased in 1848 by Warren who used the bones in his studies of the osteology of the mastodon.[66]

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[63] Godman's Amer. Nat. Hist., 3d ed. 1846, 2:55–63. U. Hunt & Son. Phil.
[64] Hist. of Orange County, 1847, p. 73.

Peale's Philadelphia Skeleton

55 1799-1801. *Near Newburgh.* On the farm of John Masten, bones of the mastodon were found in 1799 and sold to Peale in 1801. The bones recovered at this time consisted of the vertebrae of the neck and most of those of the back and tail; most of the ribs, both scapulae, both humeri with the radii and ulnae; one femur, a tibia of one leg and a fibula of the other; some fragments of the head and many of the fore and hind foot bones; the pelvis somewhat broken and a large piece of a tusk about 5 feet long. Peale's exertions at this locality, which lasted for several weeks, added but a few bones and teeth (Peale, ibid).

This skeleton was exhibited in London about 1802 but later returned to the United States where it remained in Peale's Philadelphia Museum for about 50 years. Warren[67] states that this specimen disappeared about 1849 or 1850 and that there is no authentic record of its later history. Lucas[68] says it was destroyed by fire together with other material in Peale's museum.

Two pieces of tusk from Orange county were in the possession of Doctor Mitchill in 1801. Mitchill, one of the proprietors of the Medical Repository, commented editorially on the discovery of the perforation in the upper jaw to receive the tusk and pointed out that this structure evidenced relationship with the elephants.[69]

56-57 1800-1809. *Montgomery* (4 miles south). Remains were found between 1800 and 1809 in two localities on the farm of Thomas Booth in the town of Wallkill, 4 miles south of Ward's Bridge. These bones were recovered from a depth of 6 feet below the surface of soil said to consist of (1) black and rich earth, (2) a stratum of blue clay, (3) a layer of white marl and (4) a layer of gray marl.[70]

58 1807-1817. *Chester.* Remains of the mastodon on the farm of Mr. Yelverton at Chester, near Goshen, were first noticed in 1807 or 1808. On May 28, 1817, Samuel L. Mitchill visited the spot and with the help of several friends succeeded in getting out a considerable number of bones, including parts of the legs, feet, shoulder blades, vertebrae and pelvic bones. Both the upper and lower jaws with the teeth and two tusks, 7 and 9 feet long, were found.

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[65] The Mastodon Giganteus of North America, 1852, p 253, pl. 1.
[66] See also Tran. Amer. Phil. Soc. n. s., 1834, 4:321.
[67] The Mastodon Giganteus of N. Amer. 1852, p. 252, pl. 1.
[68] Animals of the Past, 4th ed., 1916, p. 206.
[69] Medical Repository, 1801, 4:308.
[70] Arnell, Medical Repository, 1809, 6:315-16.

The bones were recovered from a layer of peat and were nowhere in contact with the marl that underlaid this formation at a depth of about 6 feet. Beneath and immediately around the bones was a mass of coarse vegetable fibers said to resemble chopped straw — perhaps the remains of the last meal.[71]

59 1829. *Montgomery* (vicinity). In 1829 remains of a young specimen were disinterred by Archibald Crawford in the vicinity of Montgomery and said to have been placed in the museum of Peale of New York. Besides many bones of the trunk and limbs, both tusks and jaws were found. Dr John Godman directed attention[72] to the presence of sockets and a fragment of tusk in the right side of the lower jaw, and upon this evidence attempted to establish a new genus and species under the name Tetracaulodon mastodontoideum. The specimen is of particular interest, however, because of the retention of sixteen teeth in the jaws, there being two teeth on each side, above and below, in addition to the permanent complement.

60 1838. *Near Newburgh.* In 1838 a tooth was found by Daniel Embler of Newburgh, on or near the farm of Samuel Dixon of that city.[73]

61 1843. *West Point.* Issachar Cozzens[74] in 1843, records mastodon remains from a bog at West Point. This is perhaps the discovery to which Mather,[75] referred in the following terms: "Bones of this animal (mastodon) are now (September 16, 1843) being disinterred from the marl underlying peat in a marsh in Orange Co."

The Shawangunk Head

64 1844. *Scotchtown.* "In 1844, [remains were] found 8 miles southwest from Montgomery, on the farm of Mr Conner near Scotchtown, in Wallkill."[76]

The remains in this case consisted of one of the largest and best preserved heads ever found, but only a few other bones. Warren[77] has figured and described this specimen, which is now in the American Museum, New York City. The jaws retained ten teeth; three each on the right side above and below and two on the left. The tusks of the upper jaw, said to have been perfect when found, disintegrated soon after exposure to the air. Traces of the sockets for tusks in the lower jaw are present, more pronounced on the right side. The head and other fragments were covered first by a layer of gravel, second by marl, third a layer of peat.

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[71] Mitchill in Cuvier, Theory of the Earth, 1818, p. 376, pl. 7, fig. 1–4, pl. 8, figs. 1–3. Hovey, N. Y. Acad. Sci. Ann., 1908, 18:147, pl. 5.

[72] Amer. Phil. Soc. Tran., 1830, 3:478–85.

[73] Eager, Hist. of Orange Co., 1847, p. 73.

[74] History of Manhattan or New York Island," New York 1843, p. 103.

[75] Nat. Hist. N. Y. Geol. pt 1, 1843, p. 636.

[76] Eager, Hist. of Orange Co., 1847, p. 73.

[77] The Mastodon Giganteus of North America, 1852, p. 125–32, pl. 16.

The Warren Mastodon

63 1845, August 12. *Newburgh.* This skeleton, first described by A. J. Prime,[78] came from the farm of Nathaniel Brewster, near Newburgh. It is the finest and most complete specimen ever collected and the subject of an elaborate account by Dr John C. Warren,[79] its one time owner. With the exception of a few toe bones and vertebrae of the tail, the skeleton is complete. Both upper tusks and the lower tusk of the right side are present, the former measuring 8 feet 6 inches in length.

The soil at the bottom of the small pond or bog in which the bones were found, was composed of the following materials: (1) a layer of peat about 2 feet thick; (2) a layer of moss described as red, about 1 foot thick; (3) a layer of shell marl in which most of the bones were embedded. Some of the bones of the limbs extended below the layer of marl and were embedded in mud. The Warren mastodon is mounted and on exhibition in the American Museum of Natural History, New York.

64 1845. *Hamptonburg.* Remains were found, " . . . on the farm of Jesse C. Cleve, Esq., in Hamptonburgh, about 12 miles southeast of Montgomery."[80]

65 Date? *Goshen.* Mastodon remains were found in the town of Goshen sometime before 1846 but the exact locality and circumstances of the discovery are not known.[80]

66 Before 1850. *Near Newburgh.* A large tooth from Newburgh about 3 miles from the Warren mastodon locality was described and figured by Warren (ibid. pl. 10).

67 Date? *Near Newburgh.* Warren also mentions (page 173), " a specimen of silicified os femoris, 3½ feet long. It was found in Orange county, New York, not far from Newburgh. It is almost

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[78] Amer Quar. Jour. Agr. and Sci., 1845, 2:203–12, pl. 4.
[79] Warren, The Mastodon Giganteus of North America, 1852.
[80] Eager, p. 73.

as dark as ebony, has a brilliant exterior, and requires the full strength of a laboring man to lift it."

68 1873. *Near Newburgh.* Among the specimens in the collections of the State Museum are parts of two ribs and a sternal bone from the vicinity of Newburgh. These bones form part of a collection made during 1873; the entire lot consists of seven sternal bones, five foot bones, four vertebrae and two rib fragments.[81]

The Marsh Skeleton

69 1872. *Otisville.* This skeleton, complete except for the bones of the hind legs, was exhumed by Mr A. Mitchell in February 1872 on his grounds at Otisville. It was later secured by Prof. O. C. Marsh and mounted for the Peabody Museum of Yale University. The following note is from an unsigned editorial:[82] "The bones were found on and in clay beneath a deep bed of muck, and are in an excellent state of preservation." The skeleton was restored, described and figured by O. C. Marsh.[83] The bones are those of an adult animal with the epiphyses of the vertebrae and limbs firmly ossified, in some cases to the extent of obliterating the sutures. Eight teeth are present in the jaws, well preserved though some, particularly the penultimate molars, are considerably worn. Both tusks of the upper jaw were found but no evidence of the lower ones.

The Whitfield Skeleton

70 1879. *Little Britain.* Before the better preserved and more complete Warren skeleton was purchased for the American Museum of Natural History, a composite skeleton, restored from remains of several individuals but chiefly from the bones found at Little Britain, was exhibited for many years. R. P. Whitfield,[84] onetime curator of geology and palaeontology in the American Museum, gives the following account of the recovery of this specimen: "The bones of the skeleton . . . were found embedded in peaty material on the edge of what was, less than 50 years before, an open pond of considerable size, subsequently drained and brought under cultivation, situated in the town of Little Britain, about 9 miles southwest of Newburgh, N. Y., and at the time of their discovery, cultivated as a potato field." A leg bone was found at a depth of 14 inches below the surface by a farmer engaged in ditching. The discovery induced greater efforts and within a few days almost one-third of the skeleton, including the head, was unearthed.

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[81] N. Y. State Mus. 27th Annual Rept, 1875, p. 24.

[82] American Jour. Sci., 3d ser., 1875, 9:483.

[83] Amer. Jour. Sci. 3d ser., 1892, 44:350.

[84] Guide to Geol. and Paleontological Collections in Amer. Mus. 1892.

In the restoration, the tusks and lower jaw were from a specimen from Hoopeston, Ill., the pelvic bones and three ribs from another individual from Hangman's creek, Oregon. Some of the vertebrae of the neck and back and most of those of the tail, were modeled. A part of the right scapula was also restored. The Whitfield skeleton was disarticulated and sold to the Senckenburg Museum, Frankfort, Germany, in 1910.

71 1895. *Cornwall.* Heinrich Ries (N. Y. State Mus. Bul. 12, 1895, p. 109) records, without giving definite information, the bones of a mastodon from the vicinity of Cornwall. "Clay was observed in a meadow opposite the Roman Catholic church; it was exposed in digging drainage trenches. Near this locality, but a little nearer the river, were found several mastodon bones." See also, N. Y. State Mus. Bul. 35, 1900, p. 583.

72 1899. *Arden.* "Parts of a skeleton were exhumed near the village of Arden on lands of Mr E. H. Harriman. Efforts made to secure all the bones resulted in uncovering only a few portions of the scapula or pelvis, leg, ribs, and two teeth. The soil was peat or vegetable mold." [85]

The Schaeffer Skeleton

73 1899. *Newburgh* (3 miles west). Almost an entire skeleton, now restored and on exhibit in the Brooklyn Museum, was found in 1899 on the farm of F. W. Schaeffer about 3 miles west of Newburgh. The skeleton lacked the bones of the legs and feet (except about twenty phalanges), one scapula and a number of the vertebrae and ribs. H. F. Osborn, who examined the locality, made the following observations: "The deposition is in three levels, the two upper being separated by a smooth, clearly defined surface, and by slight differences in the character of the soil, which is largely dark and thoroughly decomposed vegetable matter, intermingled with a few stones and very numerous remains of trees of various sizes. Examination of the latter gives abundant evidence of the existence of beaver in this hollow in the period of the mastodon, and we can easily imagine that the different soil levels were due to the building of successive beaver dams." [86]

74 1888–1901. *Monroe* (plate 7). During a period of drouth in 1888, some bones and tusks of the mastodon were recovered from

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[85] J. M. Clarke, N. Y. State Mus. 3d Rep't of Director, 1907, p. 60.

[86] Osborn, H. F., Science n. s., 1899, 10:539.

the bottom of a small pond on the lands of Martin Konnight near Monroe, N. Y. Both tusks of the upper and lower jaws, several ribs, a scapula, foot bones, a tibia and other leg bones were found at this time and kept intact by Mr Konnight. Excavations carried on in 1901 by Jacob Van Deloo, under the direction of Dr John M. Clarke, brought to light many additional parts of the skeleton and a few fragments of bones of a horse thought to be of the same age as the mastodon. Here also was found the proximal half of the femur of a large bear comparable in size to the existing grizzly.

The remains of the Monroe mastodon are of particular interest not only because of the presence of the lower jaw tusks but on account of the great size of the bones.[87]

75 1901. *Arden.* In 1901 a tusk and a few bones were found near the village of Arden.[88]

76 1902. *Balmville.* From the grounds of the George Gorden estate near Balmville, there were recovered in 1902, part of a cranium, lower jaw, one 7-foot tusk, eighteen ribs, fourteen vertebrae, and some foot bones. The soil consisted of muck and marl, the latter resting on a boulder pavement. The bones were buried at depths varying from 2 to 8 feet and were recovered both from the muck and marl.[89]

77 1913. *Harriman* (plate 5, lower figure). While taking muck from the bottom of a pond during the summer of 1913, W. J. Post of Harriman found and presented to the State Museum a very well-preserved tusk of a mastodon. The pond from which the specimen was recovered lies about 2 miles south of Harriman Station on the line of the Erie Railroad. The tusk was buried at a depth of 6 feet in the muck of the pond bottom and has the appearance of being that of a young animal. It is about 6 feet long with the tip unworn and sharp and where the surface is unbroken, the grain resembles ebony both in color and texture. Mention of this specimen was made in the 13th Report of the Director of the State Museum, 1918, pages 46-47.

78 1917. *Temple Hill.* "During the summer of 1917, remains of a mastodon were found on the muck land of Antonio Fisher, one-half of a mile west of Temple Hill monument and 1 mile north of Vails Gate Junction. The find consists of a few scattering bones together with a well-preserved lower jaw containing four

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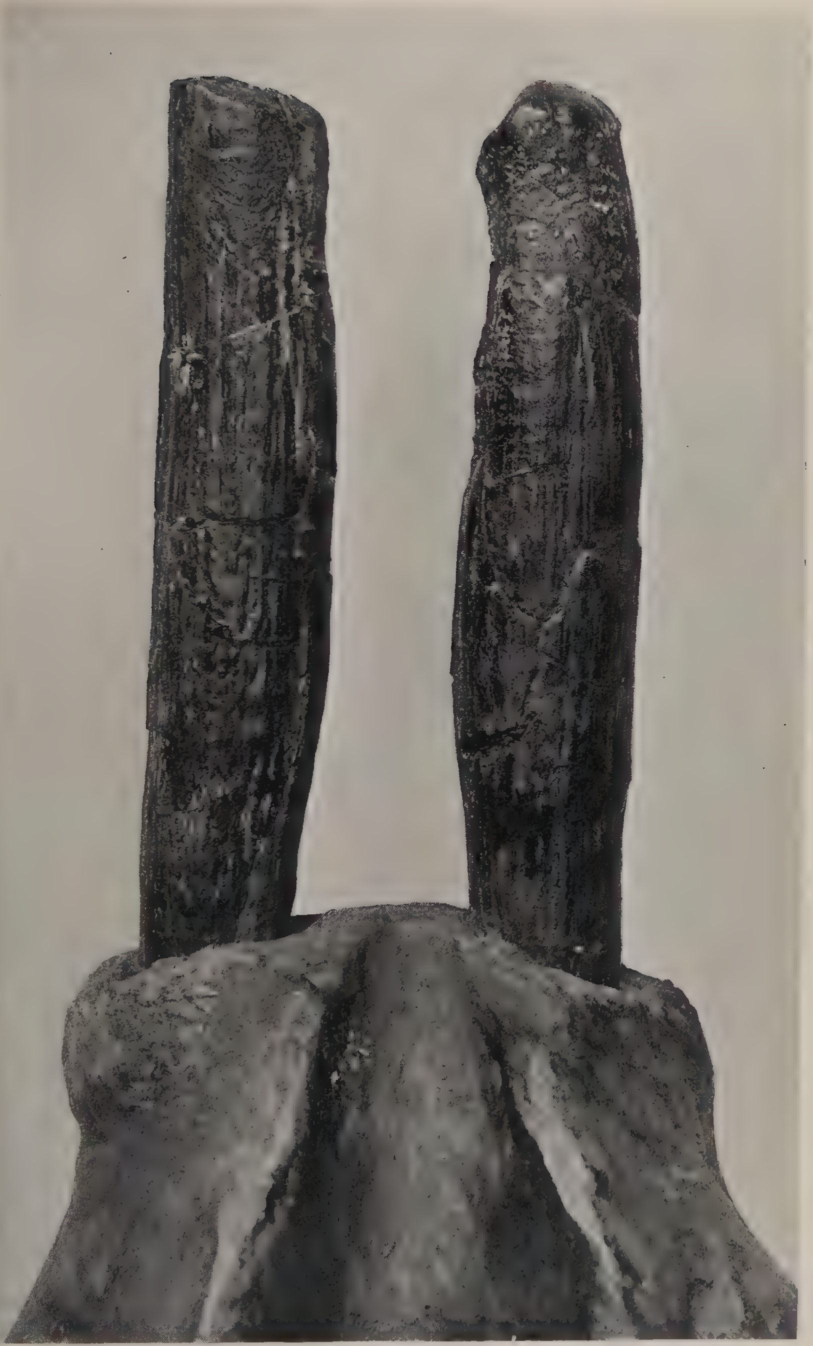
[87] Clarke, N. Y. State Mus Bul. 52, 1902, p. 439.

[88] Clarke, N. Y. State Mus. Bul. 69, 1903, p. 926.

[89] Gordon, Science, n. s. 1902, 16:594; Clarke, N. Y. S. Mus. Bul. 69, 1903, p 926.



Tusks of the lower jaw of the Monroe (Orange co.) mastodon. Lower tusks are rarely developed in the American mastodon.

teeth. These remains were found in a shallow excavation 2 feet below the surface. In size the jaw is slightly larger than that of the Cohoes mastodon."[90] The specimen remains in the possession of the finder.

The Temple Hill Skeleton

(Also named the McMillin Mastodon as a memorial of the late Emerson McMillin who defrayed the cost of acquisition.)

79 1921. *Temple Hill* (plates 8–9). This skeleton, exceeded in size by no mounted specimen except the Warren mastodon and second only to it in completeness, came from the muck lands near Temple Hill only a few hundred feet from the site of the excavation that produced a lower jaw and other bone fragments of another individual in 1917. A part of the cranium was noticed in the fall of 1920 during construction of a drainage ditch but condition of soil and weather prevented excavation. Following a protracted drouth in the spring of 1921 the work of exhuming the skeleton commenced and within a few days all the large bones were recovered. Some of the ribs, back and tail vertebrae, a part of the cranium and a few toe bones are lacking. The many free epiphyses and the condition of the teeth show that the bones belonged to a young but nearly full-grown animal.

The topography of the land in the vicinity and the disposition of muck and marl reveal the former existence of a pond of considerable extent; the area is now partly drained and under cultivation. The position in which the bones were found gives support to the theory that the mastodon mired while foraging along the boggy margin of the pond, for head and tusks were nearest the present surface of the ground, as if thrown back in an effort to keep them above water. The muck at the site of the excavation varies from 1 to 3 feet in thickness and covers marl of unknown depth. Most of the bones were recovered from the marl but all were within 5 feet of the surface.

In view of the great size and relative completeness of the skeleton and its extraordinary preservation, attention may be directed to some of its interesting features.

Dentition. Twelve teeth are preserved in the jaws, three on each side above and below; the so-called intermediate molars show considerable wear and are retained anteriorly by a thin shell of bone. The worn surface of the ultimate molars involves only two anterior crests.

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[90] Clarke, N. Y. State Mus. Bul. 196, 1918, p. 47.

Tusks. Exact measurements are impossible owing to the destruction of the basal portions, but the tusks as recovered are each over 7 feet in length and so curved that the points overlap about 10 inches. Apparently worn by contact when under strain, the upper and inner side of the point of the right tusk is beveled and fits a similar area on the lower, outer side of the left.

Styloid process. The left styloid process of the temporal bone was found, but a careful search failed to recover the right. It measures 9¾ inches in length, is perfectly preserved and of very dense texture.

Food. Most of the large bones had been taken from the excavation before the attention of the museum authorities was called to the discovery. In removing the bones great masses of broken twigs and plant remains were brought into view and their position in relation to the ribs and other bones gives considerable support to the theory of postprandial death by miring. The stomach contents were scattered and lost by the truck farmer who discovered the bones.

In opposite columns the measurements of the Temple Hill skeleton are given for comparison with those of the Warren mastodon.[91]

	Warren	*Temple Hill*
Length, base of tusks to drop of tail......	14 ft. 11 in.	15 ft. 1 in.
Height to top of spines of back at the shoulders	9 ft. 2 in.	9 ft.
Tusks: length of right tusk, on outside curve	8 ft. 6 in.	7 ft. 5¼ in. (base lost)
length of left tusk, on outside curve	....	7 ft. 4½ in.
Thigh bones: length of right............	3 ft. 5 in.	3 ft. 6½ in.
length of left..............	3 ft. 6½ in.	3 ft. 6 in.
Pelvis, or innominate bones, width of.....	6 ft.	5 ft. 7¼ in.

The Temple Hill skeleton stands in the Hall of Fossil Vertebrates, New York State Museum.[92]

Orleans County

80 1825. *Holley.* During the excavation of the Erie canal, which was completed in 1825, a large molar tooth was found in a swamp near the village of Holley.[93] An account of this find is given in the "Pioneer History of Orleans County"[94] which states,

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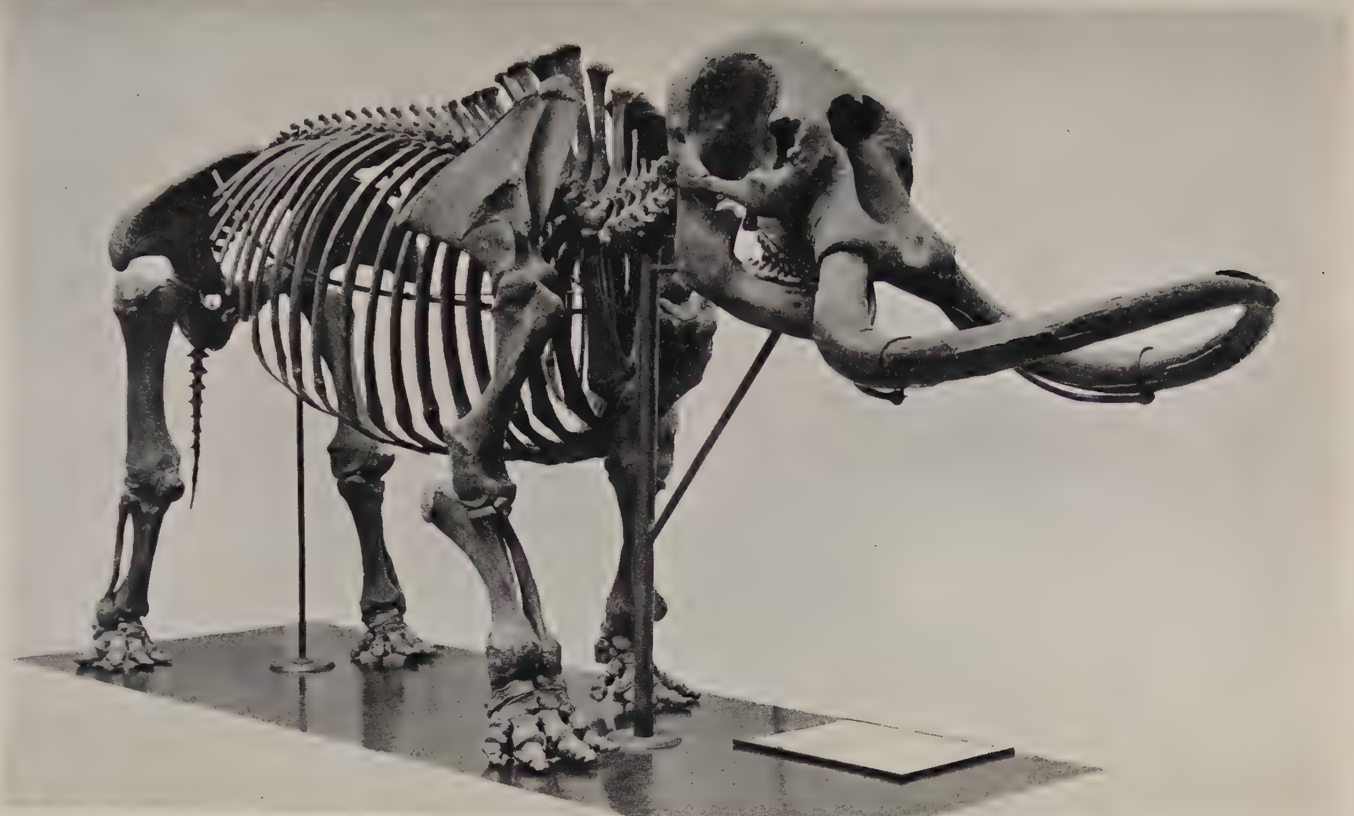
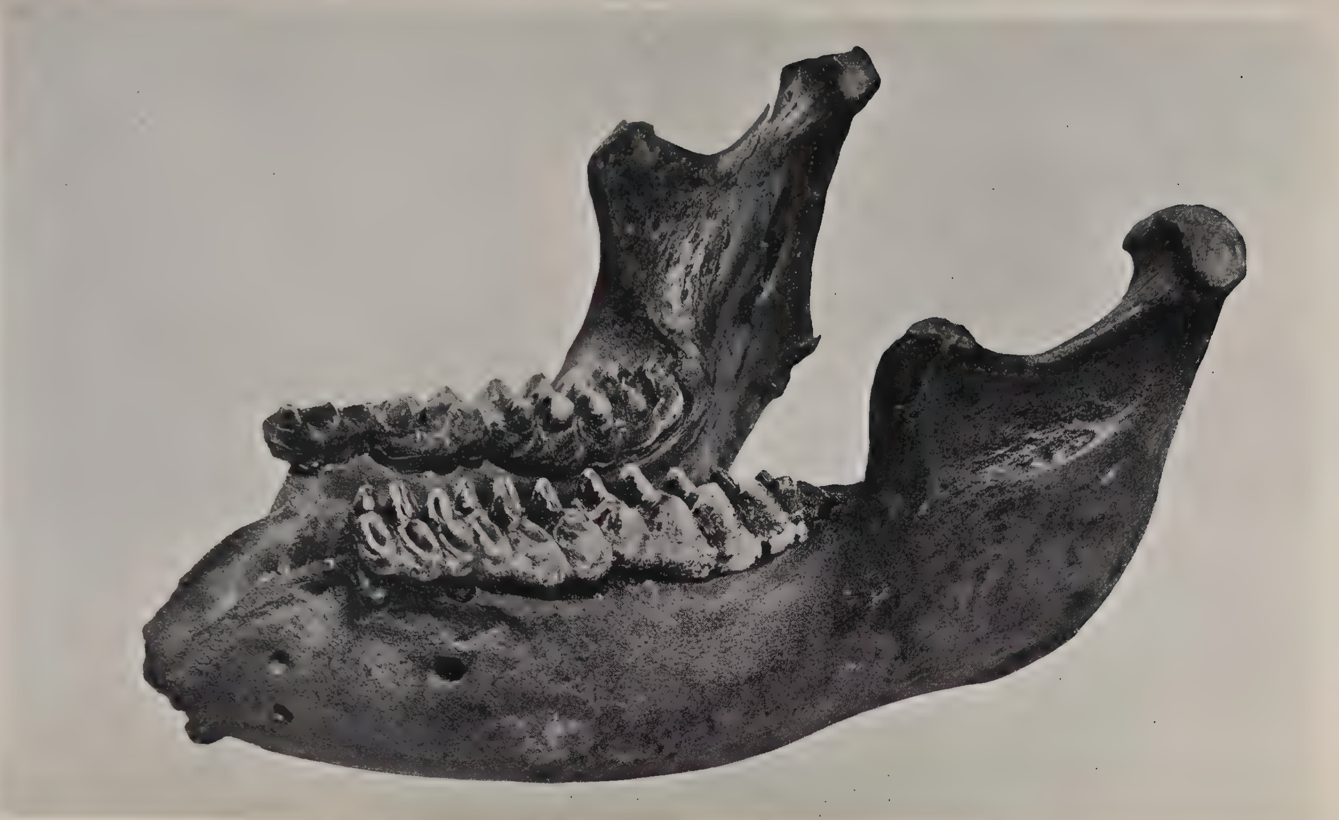
[91] Data on Warren mastodon taken from Amer. Mus. Jour., 1907, 7:92.
[92] See also Science, n. s. 1921, 54:170.
[93] Hall, Nat. Hist. N. Y., Geol. pt 4, 1843, p. 364.
[94] By Arad Thomas, 1871, p. 307.

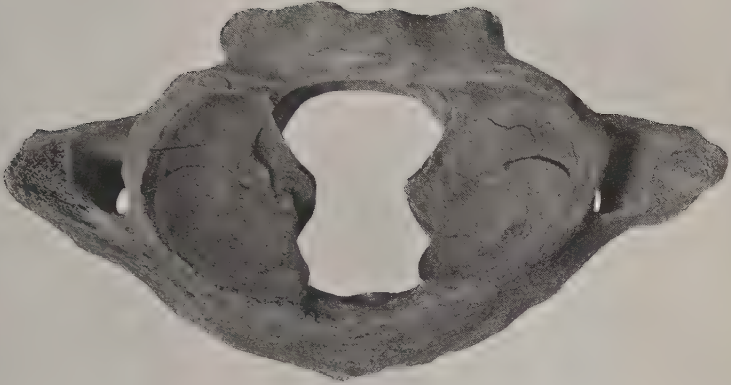


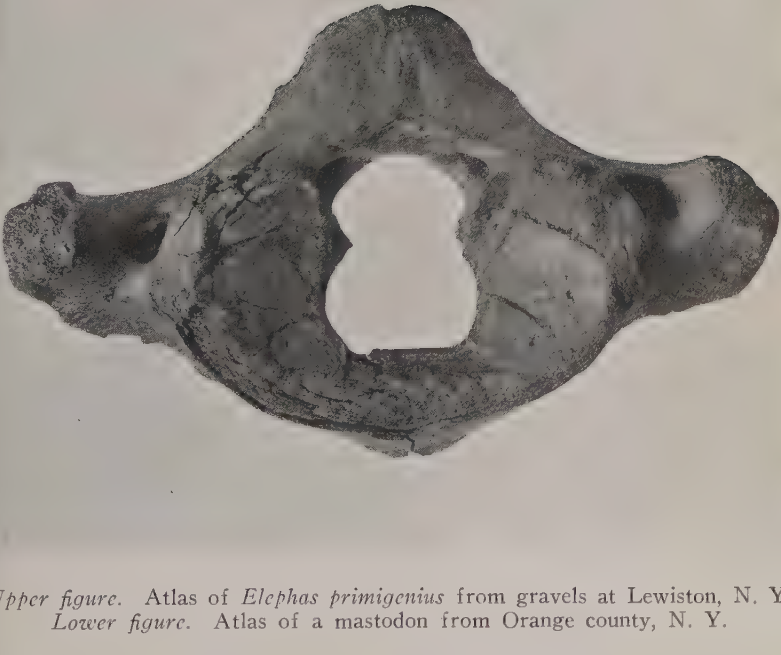
The Temple Hill skeleton as mounted in the New York State Museum.



Lower jaw of the Temple Hill mastodon. Twelve teeth are retained in the jaws, three on each side, above and below.

Plate 10





Upper figure. Atlas of *Elephas primigenius* from gravels at Lewiston, N. Y.
Lower figure. Atlas of a mastodon from Orange county, N. Y.

"When laborers were excavating and building the canal embankment, a tooth of some huge animal, a mammoth, perhaps, was dug up. The tooth was a grinder, and weighed 2 pounds and 2 ounces. No other bones of such a creature have been found, and it has been conjectured this tooth must have been shed there by the animal to which it belonged, when it came after salt. It is now in the State collection in Albany." The tooth above described may be the one referred to by DeKay[95] when he says, "There is, however, in the museum of the Albany Institute, a portion of the tooth of an elephant said to have been found on the line of the Erie canal, but the precise locality is not known." During the construction of the Erie canal a true mammoth was found at Chittenango, and it is possible that DeKay's reference is to one of the teeth of the Chittenango specimen. DeKay does not state whether or not he saw the tooth, and because it can not be found among the collections of the Albany Institute, there is some doubt as to whether it belonged to a mammoth or mastodon. The Erie canal passes through Holley at an elevation of 500 feet. The beach of glacial Lake Iroquois is within 3 miles to the northeast of Holley so that the tooth was found outside of the province of this glacial lake. We have thus no evidence that the tooth was deposited through the agency of glacial waters, unless it was by the higher waters of glacial Lake Tonawanda, which had one of its outlets at Holley and whose waters poured into Lake Iroquois.[96]

81 1894. *Medina.* Among the collections of the Buffalo Society of Natural Sciences is a lower jaw with teeth of a mastodon. It was found in a swamp about 4 miles from Medina by W. S. Slodge, and through the efforts of Prof. F. K. Mixer was presented to the Buffalo museum by John Moore.

Queens County

82 1858. *Jamaica.* The following is the account of the Jamaica pecimen, as given by J. C. Brevoort:[97]

"Five molar teeth and a few fragments of bones belonging to the Ameri- an Mastodon were found on Long Island toward the end of last March, by the workmen engaged in removing the pond muck at the head f Baiseley's pond near Jamaica. This pond is an artificial one, covering ome 40 acres in a shallow valley, and is one of the series of five similar onds which are now being prepared and cleaned out for the purpose of ffording a water supply to the city of Brooklyn. In Baiseley's pond a deposit of mud, in some places 6 feet in depth, has to be removed before exposing the gravel bottom. This deposit is continued for some distance up the valley and beyond the flow line of the water, thus proving that most of this deposit has been the result of vegetable growth in the open air. In this last locality the boggy surface is covered with a thick carpet of moss interspersed with a few trees which are able to flourish in such a soil.

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[95] Nat. Hist. N. Y., Zool. pt 1, 1842, p. 101.
[96] U. S. G. S. Niagara Folio, 190, p. 19, fig. 10.
[97] A. A. A. S. Proc. 12th meeting, May 1858 (1859) p. 232–33.

The remains in question were discovered in this last-mentioned spot, about 20 yards from the channel of the stream which runs into the pond, and resting on the gravel, covered by about 4 feet of the muck or peat.

The bones and a few fragments of an ivory tusk are much broken up, and crumble on exposure to the air. The top of the lower jaw is very distinct. Two of the pieces of bone show articulating surfaces, but their exact position in the skeleton has not been determined. They appear to belong to the fore leg. The five molar teeth were in excellent preservation, the enamel being colored black, but perfect, while the roots were less complete, but nearly whole.

According to Owen's Odontography, where the series of teeth is figured, it would appear that the present molars were those of a young adult mastodon. The anterior ones are worn on every cusp, while the large posterior molar is only slightly worn on two of the anterior cusps.

From the fact that so few bones were found, it would seem that the animal (as in some other localities has been supposed to be the case), was not mired in the spot where the fragments were found. Neither could they have been washed by floods into their position, for the Long Island streams are not subject to freshets, their course being too short and the soil too porous to allow the accumulation of waters overflowing their banks. It is, however, probable that the creature died not far from the spot where these remains were found, and that they were gradually covered up by the vegetable growth of centuries.

The Jamaica specimen is probably the one referred to by Prof. D. S. Martin[98] when he stated that a mastodon was exhumed in excavating for the Ridgewood, L. I., reservoirs. Ridgewood is west of Jamaica and its reservoirs, like the one near Jamaica mentioned by Brevoort, supply water to Brooklyn.

Richmond County

83 1899. *New Dorp.* In the museum of the Staten Island Institute of Arts and Sciences are fragments of a tooth which were found in a swamp at the Moravian cemetery at New Dorp, Staten Island. An account of this find was given by Dr Arthur Hollic and was published in the Annals of the New York Academy o Sciences, volume 14, 1901, pages 67-68. The following descriptio is from the above publication:

The surface deposit was found to consist of a fine moss peat and coarse peat composed of all kinds of swamp vegetation, extending out t the margin of the pool, while below this and forming the bottom of th pool was a black organic mud, such as may be seen in almost any swam where decaying vegetation has accumulated. Below this the deposit wa a fine sandy silt, distinctly stratified, the layers following the general co tour of the depression, thicker towards the middle and thinning out the edges. The general shape of the depression is roughly pyramidal, with steeper sides on the north and east than on the south and west. The deepest part is in the northeast angle, where the entire deposit was about 25 feet in thickness. All this deposit has been taken out and the sides and bottom of the depression are now exposed to view.

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[98] N. Y. Acad. Sci. Trans. 1885, 5:15.

The first thing which attracted my attention was a number of logs and branches in the upper part of the silt, beginning at a depth of about 5 feet from the surface. There was nothing in connection with these to indicate that they were anything more than the remains of a comparatively recent forest growth. Below this, however, at a depth of about 8 feet, were a number of layers, aggregating about 2 feet in thickness, containing a large number of small cones and twigs. There are no coniferous trees now growing in the vicinity and no record of any in recent years so that these were manifestly the remains of a forest growth which antedated the one now growing there and a subsequent careful examination and comparison of the cones showed them to belong to the white spruce (Picea canadensis (Mill) B. S. P.)—a tree of northern range, which does not now extend farther south than northern New Eng-and and the Adirondacks — and this fact naturally led to the conclusion that at least the lower portion of the deposit was of Quaternary age.

On inquiry of the superintendent of the cemetery, Mr N. J. Ostrander, nformation was subsequently obtained to the effect that "some bones" had been dug out by one of the workmen, at a depth of about 23 feet, and hese were very kindly turned over to me. They proved to be the broken pieces of a mastodon's molar and the Quaternary age of the deposit was established beyond question and inasmuch as it was in morainal basin it must all have been post-morainal in age.

The indications are that a pond was formed in the depression immediately after the recession of the ice sheet and that this pond was a eceptacle for silt, dust and decayed vegetation ever since; the accumulaions finally filling it up and converting it into a swamp, with a little pool of casual water remaining in the middle.

Incidentally it may also be worth recording, that a considerable amount f charcoal and charred wood was found in connection with the cones, ear the northeastern side, which fact might indicate the presence of man t the time this portion of the deposit was laid down.

Another account of this find is published in the Proceedings of he Natural Science Association of Staten Island, volume 7, no. 10, ages 24 and 25. This description is also by Doctor Hollick and is a imilar account to the one above quoted. Further notes on this ocality are given in the "Proceedings of the Natural Science Assoiation for February 10, 1900." This records a piece of wellgnitized wood in this deposit. The specimen was apparently conerous. See also Plant World, December 1900, page 184, for rther description of the deposits found in the swamp and its eological history.

84 1894. *Staten Island sound.* The following brief notes reting to this find have been published:[99] "Mr L. W. Freeman presnted a mastodon's tooth, obtained from Staten Island sound by r Seeley Van Pelt, while tonging for oysters. Its value was not nderstood by the finder, who allowed it to be thrown away, with

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[99] Nat. Sci. Assoc. Staten Island, Proc. 1894, 4:18, 32.

the refuse oyster shells, into Old Place creek, from whence it was recovered by Mr Freeman." (Page 18).

"Mr Arthur Hollick stated that the mastodon's tooth, shown at the March meeting, has been submitted to Prof. R. P. Whitfield, of the American Museum of Natural History, who had kindly identified it as a sixth molar of Mastodon gigantea Americanus. It contains the second, third and fourth crests. The first crest and heel on fifth crest are broken off." (Page 32).

Rockland County

85 1817. *New Antrim* (now Suffern). The first account of this find was in a letter written shortly after the discovery of the mastodon, by Edward Suffern to the Hon. Samuel L. Mitchill and printed in the American Monthly Magazine[1]. The text of the letter is as follows:

> On Saturday last, a man in the employ of my father, in digging a drain or ditch through a miry swamp, discovered, about 3 feet from the surface of the earth, several pieces of teeth of enormous size: — from their appearance, shape, and the manner they are worn away, the animal must have lived I suppose to a great age, and belonged to the Granivorous species; who have probably inhabited this region, and become extinct previous to the discovery, or at least the settlement of this country by the Europeans. The largest piece appears to belong to the extreme back tooth of the under jaw, and is 8 inches in length, 4 inches in breadth, and 3 inches in height, from where it has rested on the jaw bone to the head or top of the tooth, (though it evidently appears that one-half of its original size is worn away by mastication), weighing 3 pounds 6 ounces, Avoirdupois weight. The enamel is the principal part of the tooth that is preserved; the root or periostium is chiefly decayed and, upon being exposed to the air, moulders away. The ditcher, before he discovered the teeth, broke them while digging with the spade: these are full of marrow resembling lard. If you should deem a further discovery necessary to aid you in your scientific pursuits, I shall be happy to see you at my residence, or I will carefully preserve the pieces, and bring them with me to New-York for your inspection and examination.

The mastodon remains were presented to Mitchill and by him donated to the New York Lyceum of Natural History. Mitchill states[2] that the bones were found on "E. Suffern's farm, 32 miles from New York City, and 11 miles west of the Hudson river, in New Antrim, Hemstead town" (now Ramapo). The locality is near the west border of the Triassic area (Newark formation) of Rockland county and within a mile of the New Jersey state line.

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[1] 1817, 2:46. See also p. 56, 57.

[2] Catalogue of Organic Remains presented to the New York Lyceum of Natural History by Samuel L. Mitchill, New York, 1826. Cat. no. p. 11.

Another account of this mastodon is given by Mitchill[3] and he states that the fatty substance contained in the cavities of the teeth, mentioned by Suffern, no longer remained when the teeth reached him. Two figures of one of the teeth are also given by Mitchill.

Schenectady County

86 1914. *South Schenectady.* In this year Richard Ribley found and brought to the State Museum for identification, a fairly well-preserved, medium-sized tooth of a mastodon which he had obtained from the extensive gravel deposits at South Schenectady. The gravel deposits at that place are of delta origin and were laid down near the western margin of glacial Lake Albany by the flood of waters, which coursed eastward through the Mohawk valley and carried all the outflow waters of glacial Lake Dawson and its successor early Iroquois. This was before the latter lake had reached its maximum extent and before the greater Mohawk had carved the many potholes in the rocks at Cohoes,[4] in one of which the Cohoes mastodon was found.

Seneca County

87 *Lodi.* Among the collections of the American Museum of Natural History, there is a tooth which carries this label, "Tooth of Mastodon (5th and 6th) found at Lodi, Seneca Co., N. Y. Presented by Wm. Nevius, N. Y." No information is available as to date, character of deposits or the depth at which the tooth was found. The town of Lodi borders Seneca lake and Lodi village is 2½ miles east of the lake at an elevation of 1045 feet, and a mile or more from the divide between Seneca and Cayuga lakes.

Steuben County

88 1874. *Wayland.* The following account, relating to the contents of a mastodon's stomach, is printed in the Proceedings of the Boston Society of Natural History for 1874 (page 91):

"Mr Charles Stodder exhibited, with the microscope, a slide showing some of the contents of a mastodon's stomach. The material from which the slide was prepared, received through the kindness of Mr Morehouse, was obtained in Wayland, N. Y., and he had sent it to Dr J. G. Hunt, of Philadelphia, for determination and preparation. Respecting this material Doctor Hunt reports as follows:

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[3] Observations on the Geology of North America. p. 390; in Essay on the Theory of the Earth by M. Cuvier, New York, 1826. In the text Mitchill states that the illustrations of the tooth are on plate 2, figures 1 and 2. The copy examined by the writers has three press-numbered plates, VI, VII and VIII, and the tooth is illustrated on plate VI, figures 1 and 4. The remains are also described in Godman's American Natural History, 1836, 2: 77.

[4] See Stoller, "Glacial Geology of Schenectady Quadrangle," N. Y. State Mus. Bul. 154, 1911, p. 16, 34.

> The remains, both of cryptogams and flowering species, were in abundance. Stems and leaves of mosses, wonderfully distinct in structure, so much so that I could draw every cell. I even readily detected confervoid filaments, with cells arranged in linear series, resembling species now found in our waters. Numerous small black bodies, probable spores of the mosses, were found in abundance. Not a fragment of sphagnum was seen in the deposit. I found, however, one fragment of a water plant, possibly a rush, an inch long, every cell of which was as distinct as though growing but yesterday. Pieces of woody tissue and of bark of herbaceous plants, spiral vessels, etc., were abundant. Carapaces of Entomostraca were present, but no trace of coniferous plants could be detected. It hence appears that the animal ate his last meal from the tender mosses and boughs of flowering plants growing on the banks of the streams and margins of the swamps, rather than fed on submerged plants; and it is probable, moreover, that the pines and cedars, and their allies, formed no part of the mastodon's diet.

The above account does not give any information concerning the find, but in a footnote in "A History of Livingston County, New York"[5] the following is printed: "Within the last 2 years several bones of a mastodon were discovered on the borders of the county near Dansville, some 8 feet below the surface, a portion of which are now in the possession of Professor Allen of the State Normal School at Geneseo."

Dansville is 5 miles west of Wayland, and the county line passes between them less than 2 miles from Dansville. The dates given in the above brief accounts show that the year was 1874, and therefore both undoubtedly relate to the same find in the town of Wayland, Steuben county.

89 1907. *Perkinsville* (plate 14). The remains of the Perkinsville mastodon are in the State Museum and an account of this find has been given by Clarke,[6] who states:

> This skeleton was found in August last by John Morsch on his farm near the west end of Perkinsville swamp and three-fourths of a mile north of the railroad station of Portway. This swamp is a nearly equilateral triangle about 1½ miles on the side. It occupies a shallow depression in a mass of morainic drift of unknown depth at the head of the Cohocton valley and is adjacent to the west side of a low ridge that separates the drainage area of the Cohocton river from that of the Canaseraga creek. It has an altitude of 1360 A. T. The surface layer of the swamp is black muck to a depth of 6″—1′, beneath which is a bed of nearly white marl 6″—6′ in thickness. The bones were found about 26 rods from the highway and 4 or 5 rods from the north edge of the black soil or border of the swamp. In digging about a small boulder Mr. Morsch came upon one of the

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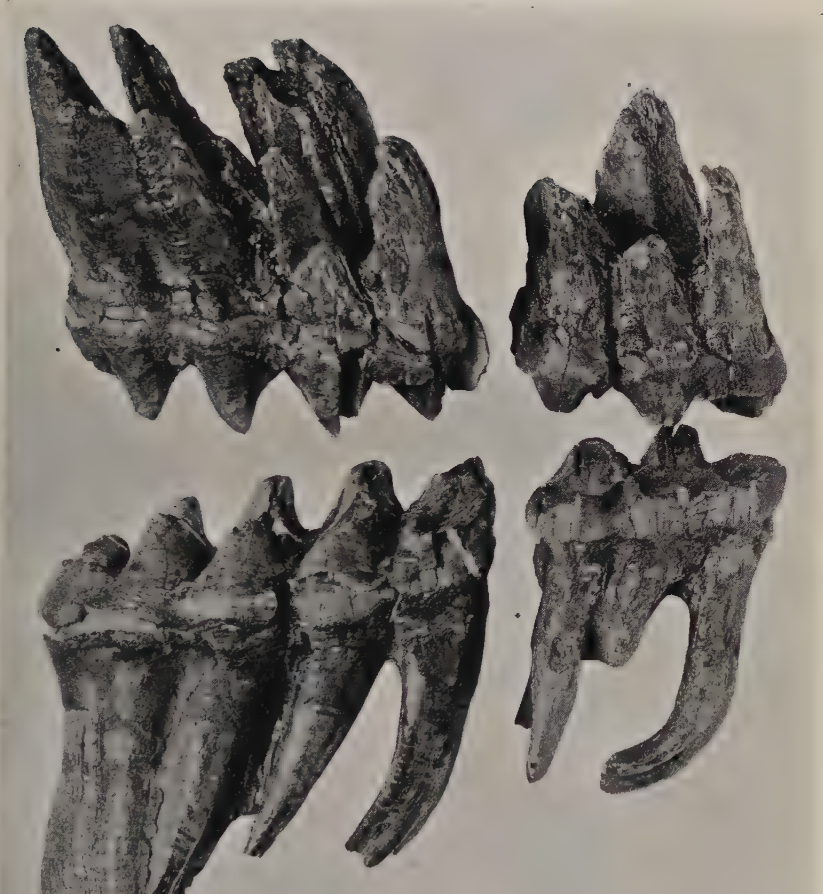
[5] By Lockwood A. Doty, Geneseo, 1876, p. 381.

[6] N. Y. State Mus. Bul. 121, 1908, p. 44, 45.

Plate 11



Complement of permanent molars, from right side of jaw of the Perkinsville mastodon.

larger leg bones and proceeded to take out the remains of the skeleton. These bones lay largely in their natural position and while perhaps the numerical two-thirds of the skeleton were preserved, the more conspicuous bones were fragmentary or wanting. At the conclusion of the excavation it was found that all four legs and feet, a large number of ribs and vertebrae, parts of the shoulder girdle and one ramus of the lower jaw with teeth had been recovered. The skull with tusks, greater parts of pelvis and scapulae were gone. It would seem that the animal in sinking into the mire had been left with the more protuberant portions of the body, the head probably thrown up and back, exposed to the air and inviting the attack of rodents. The absence of these parts when all the other bones had so compactly kept together, left little likelihood of their being found in any other part of the swamp. The preservation of the bones recovered was excellent for mounting and it is to be regretted that the specimen just missed being a desirable acquisition to a scientific museum.

Suffolk County (?)

1823. *Riverhead or Southold.* In 1823, according to DeKay,[7] there was found "more than one-half of a lower jaw, with the teeth, on the shore of Long Island, between high and low water mark, about 4 miles east of the county court house at Riverhead, Suffolk county." The specimen is mentioned by DeKay as being in the Cabinet of the Lyceum of Natural History, New York. It was probably the same specimen recorded by Mitchill[8] which he states was found at Southhold on the north side of Long Island, between high and low water mark. Mitchill adds that the specimen had been satisfactorily traced to Kentucky. In view of the fact that Riverhead and Southhold are but 15 miles apart, there seems no doubt but that the finds recorded from these two places are one and the same. Moreover, since Mitchill once owned the specimen and it was presented by him to the New York Lyceum, it is believed as stated by him, that it was not originally found on Long Island and so the find is referred to here, without number, simply as a matter of record.

Sullivan County

90 1827. *Wurtsboro.* A brief account of this mastodon is given n a letter written in December 1827 by Jeremiah Van Rensselaer to Professor Silliman. The letter states[9] "That the fossil remains of a *mastodon giganteum* were discovered last autumn, by the workmen, while digging the Delaware and Hudson Canal. A considerable portion of the skeleton has arrived in this city, and I have enjoyed an opportunity of examining it. The bones which I saw,

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[7] Nat. Hist. N. Y.; Zool. 1842. pt 1, p. 103. See also record of this find in A. A. A. S. Proc. for 1858 (1859), p. 233.

[8] Catalogue of the Organic Remains, presented to the New York Lyceum of Natural History, New York, 1826. Cat. no. 1, page 5.

[9] Amer. Jour. Sci., 1828, 14:33.

are in good preservation, and seem to justify the wishes of the proprietors to set up the entire skeleton. The teeth are in perfect order. One of the tusks has arrived; it is a beautiful and perfect specimen, 9 feet long." The locality is given by Mather[10] who states that the bones "were found in digging the Delaware and Hudson canal, in a peat bog between Red bridge and Wurtsboro in Sullivan county."

Tompkins County

91 1871. *Brookton.* Mastodon remains were found in Tompkins county in 1871 and Professor Hartt of Ithaca, writing to Professor Hall under date of May 28, 1871, briefly refers to the find as follows: "We have lately found mastodon remains, good teeth but broken bones in a bog at Motts Corners (Brookton), Six-mile creek." The printed account by Professor Hartt[11] includes the following:

> At the mastodon locality the stream met with a little knob of Chemung rocks which appears to have formed at one time an island, but the creek afterward cut its way through the rock to a lower level on the left side and the channel on the opposite side was deserted. Springs, one of which is said to be salt, have kept this deserted channel wet and a bed of peat has formed which once supported some large trees. The layer of peat varies from a few inches to 2 feet or more and is full of sticks, pine knots, bark, etc., more or less decayed. Beneath this is a layer of variable thickness, rarely more than a few inches, composed of clay mixed with pebbles and pieces of shale. In this were found small fragments of bones and teeth, the former in a very decayed condition showing that the skeleton had been completely broken up and scattered. The whole rests on a bed of blue arenaceous clay with large pebbles and fragments of rock of all kinds, in fact, a modified drift. In most cases the bones were merely scattered over the surface of this bed between it and the peat. The teeth are in very good condition and not at all waterworn. The animal probably became mired near the spot. The skeleton, exposed to the action of the elements, went to pieces, and the fragments were scattered, partly by water action and partly through the agency of wild animals.

A communication to the American Journal of Science (1871, 2:58) by Prof. B. G. Wilder of Cornell, relates to the Brookton specimen. Wilder states: "Five teeth and many bones and fragments of the mastodon have been discovered in a deposit of modified drift near Ithaca, New York, and placed in the museum of Cornell University. Many more remains will doubtless be obtained, as the teeth already indicate the existence of two or more individuals; little hope is entertained, however, of finding a perfect skeleton."

The above specimen is also the one referred to by Professor Tarr[12] as having been found in a swamp in the valley bottom at Brookton.

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[10] Nat. Hist. N. Y., Geol. pt 1, 1842, p. 233.

[11] Amer. Naturalist, 1871, 5:315.

[12] U. S. Geol. Sur. Folio 169, 1909, p. 200, Field ed.

He states that the animal may have mired there after the valley was cut down to its present level or that it was washed out of the gravels and concentrated in the swampy area; it is not now possible with the information at hand, to decide between these alternatives.

92 1914. *Pony Hollow.* The account of this find as given by Pearl Sheldon[13] is as follows:

> A tusk of a proboscidean, probably Mastodon americanus, was found recently in a gravel pit in Pony Hollow, 12 miles southwest of Ithaca, N. Y., on the property of Mr Bert Drake. Unlike most mastodon finds from this region this is not postglacial. It was found in place 24 feet below the surface in stratified sand and gravel which was being used in good roads work. The pit is in the base of an extensive terrace whose top follows the valley wall high above the outwash gravel plain which occupies the floor of the valley. The exact origin of this Pleistocene terrace is obscure but it is certainly not later than the end of the ice occupation of the valley and may be earlier.
>
> The tusk was broken in removing the gravel. Two pieces, each about a foot long, from 10 to 13 inches in circumference, were presented to the paleontological museum of Cornell by E. A. Dahmen, the road engineer. Three approximate measurements of the curvature of the tusk gave from 2 feet 1 inch to 2 feet 11 inches as the radius of curvature.

Ulster County

93 1800. *Town of Shawangunk.* The first mastodon remains found in Ulster county as at present constituted was in this year. Earlier records from Ulster county were from that portion which was annexed to Orange in 1798 and are recorded under Orange county.

An excellent account of the 1800[14] find is given in a letter written by Dr James G. Graham under date of September 10, 1800 to Doctor Mitchill. In his letter Graham[15] mentions a number of localities where fossil bones had been found and at one locality some hair, about 3 inches long, of a dark dun color. The letter continued:

> And last week another skeleton has been discovered, about 3 miles east of my house, in the town of Shawangunk, about 10 miles northeast of said bridge (=Ward's Bridge). These last discovered bones lie about 10 feet from the surface, and are in a very sound state. Many of them have been raised, but some much broken, especially the bones of the head, which, I am persuaded, lie entire, and in their natural order.
>
> I have procured two bones of this last discovered skeleton, and sent them to New-York, by Edward W. Laight, Esq. for the purpose of having them examined by yourself, and other well-informed naturalists in the city. One of these I take to be a metacarpal or metatarsal bone, which indicates the animal to have been claw-footed and, from the forms of the astragalus and os calcis which were among the bones sent to Dr Bayley, to have resembled the foot of the bear. With respect to the other bone,

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[13] Science, n. s., 1915, 41:98, 99.

[14] These remains should not be confused with the well-known "Shawangunk head" which was found in Orange county at Scotchtown in 1844.

[15] Medical Repository. New York, 1801, 4:213-14.

I am at a loss where to assign it a station among those of the skeleton. . . . I have been particular in stating the relative situations and distances of those places in which bones have been discovered, from a certain point, to show, from the small district in which many discoveries have been made, the great probability that these animals must have been very numerous in this part of the country, for if we compare the small proportion that swamps, in which only they are found, bear to the rest of the surface, and the very small proportion that those parts of such swamps as have yet been explored, bear to the whole of such swamps, the probable conclusion is, that they must once have existed here in great numbers. And why Providence should have destroyed an animal or species it once thought proper to create, is a matter of curious inquiry and difficult solution. If, however, they were voracious, it must appear happy for the human race that they are extinct, by whatever means.

The hair above mentioned seems to prove that it was not the elephant, or, if it was, that it must have been of a species or variety widely different from any known at present.

A letter by Sylvanus Miller relating to this mastodon, which was written 10 days later than Graham's, was also addressed to Doctor Mitchill and published in the same volume of the Medical Repository (page 211-12). In his letter Miller says:

On my arrival at Newburgh, I was informed, that about 12 miles to the westward of that place had lately been discovered the skeleton of an animal of uncommon magnitude, and decidedly larger than that of any of which we have at this time any knowledge. . . . The bones here discovered lay buried about 10 feet under this marle and earth, which generally consists of five different strata — the first is the common earth found in low meadows; the second a very black and rich earth, and is deemed good for manure; the third a small stratum of blue clay; the fourth a stratum of white marl; and the fifth a stratum of grey or black marl; at or near the bottom of which these bones are discovered, and some of them sunk into the earth some inches below the marl. . . . The bones which were lately discovered appear of the same species, though I think larger, with those found some time since in the same vicinity, and afford a spectacle truly astonishing; they appear little decayed by the lapse of time and their proper places, and names of the several parts of the skeleton, could, I presume, easily be discovered by a person possessing your knowledge in anatomical science.— They are, however, not as yet entirely procured, though great exertions have been made, and are still making, to effect so desirable an object — the difficulty is made much greater by the influx of the water, continually rushing in from the bottom and sides to the hollow already made — there are among the bones found, several of the legs, some of the back bones, several ribs, and the upper part of the head,[16] etc.— one bone of the thigh measures more than 40 inches in circumference round the joint, and 36 inches on the cylindrical part of the bone, and is nearly 5 feet long; the teeth are nearly 7 inches long, and 4 broad — they are found white, and fast in the jaw, without appearance of decay; the holes in the skull where appear to have been the nostrils, measure nearly 8 inches in diameter; the orifice occasioned by the decay of marrow is, in the back bones, 3½ inches diameter; there are several others of like magnitude, and some bones of the foot which shows evident marks that it once had claws.

The concluding quotations from both Graham's and Miller's letters indicate much doubt on the part of these early writers as to the character of the animal to which the bones belonged. This matter, however, is cleared on a later page (308) of the Repository where we find this statement, "Since the publication of the communications of Mr Miller and Dr Graham . . . other discoveries have been made. We have been informed that the upper jawbone is perforated to receive a tusk, like that of the elephant. . . . This structure of the head leads towards a belief that the animal was a species of elephant."

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[16] The head is thought, by Doctor Graham, to have been as large as an ordinary hogshead.

The widespread interest created by the discovery of these mastodon remains in the town of Shawangunk is shown by the fact that less than 6 months after their discovery, Thomas Jefferson, then Vice President of the United States, but President a month later, was endeavoring to obtain specimens, which he succeeded in doing. The great interest taken by Jefferson in this mastodon is shown in the article by Frederic N. Luther[17] on "Jefferson as a Naturalist," which states: "Thus, during those exciting weeks in February, 1801, when Congress was vainly trying to untangle the difficulties arising from the tie vote between Jefferson and Burr, when every politician at the capital was busy with schemes and counterschemes, this man, whose political fate was balanced on a razor's edge, was corresponding with Dr. Wistar in regard to some bones of the mammoth which he had just procured from Shawangunk, Ulster County."

That Jefferson did actually obtain the lower and upper jaws, both with teeth, of the mastodon from the town of Shawangunk, is shown by the figured specimens of a plate accompanying an article by John S. Patton[18] on "Thomas Jefferson's Contributions to Natural History." The label, photographed with the jaws, carries this inscription, "The above remains of MASTODON were collected by THOMAS JEFFERSON and by him presented to the UNIVERSITY of VIRGINIA."

94 1859? *Ellenville* (plate 12). In 1860 there was received by the State Museum[19] one tusk, 7 feet long, parts of a skull, jaws with teeth, a pelvic and thigh bone of a mastodon found at Ellenville. The remains indicate an old individual, and of special interest is the worn condition of the teeth. These, as shown by the plate, have been worn down through the dentine to the pulp cavities, which are exposed and open. The remains were found in a swamp of several acres extent, and the bones were recovered near its outlet. The swamp section showed 2 feet of peat and 3 of marl, the latter resting on a bed of clay. The bones were found in the marl. Some comparative measurements with the Cohoes mastodon are given in the last of the two references cited.

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[17] Magazine of American History, April, 1885:13:387.

[18] Natural History (Journal of the American Museum) 1919, 19: 407 (plate); see also p. 496.

[19] N. Y. State Cab. Nat. Hist., 14th Annual Rep't, 1861, p. 7, 15 and 21st Annual Rep't, 1871, p. 128.

95 1890. *Milton.* About this year a very small tooth of a mastodon[20] was found near Milton by Charles Kniffen on what is now known as the Bray farm. The tooth is probably still in possession of the finder.

Wayne County

96 1888? *Macedon.* The remains of the mastodon from the town or village of Macedon are represented by two teeth, which are in the museum of the University of Rochester. They have been identified by Dr O. P. Hay as right and left upper last molars. These teeth were in the musuem, according to a statement of Professor Fairchild, previous to 1888 but the actual date when they were received and other data relating to the find are lacking. The teeth are of average size, well preserved and very white, apparently from clean sands or gravels. Macedon is the southwestern township of Wayne county 9 miles east of the Perinton locality in Monroe county, and 11 miles south of Lake Iroquois beach. Extensive sand and gravel deposits are found in the vicinity of Macedon. They are in the Fairport-Lyons glacial channel, which carried eastward the waters of glacial Lake Dawson and early Lake Iroquois. Not all the delta deposits of ice border drainage have been plotted but the more important of them are shown on Fairchild's[21] glacial maps. The chances that these teeth were found in these glacial gravels are excellent for numerous excavations have been made in them for commercial supplies and also they have been cut through by the New York Central and the West Shore railroads and the Erie (now Barge) canal. The Rochester, Syracuse and Eastern, an electric line, also passes through this glacial channel, but this was constructed subsequent to the finding of the mastodon teeth. While it can not be proved that the teeth have definite relations to glacial waters on account of the uncertainty as to the exact spot where they were found, yet it is believed, on account of their color, that they did come from these glacial gravels and in point of age these mastodon teeth are among the oldest found in the State.

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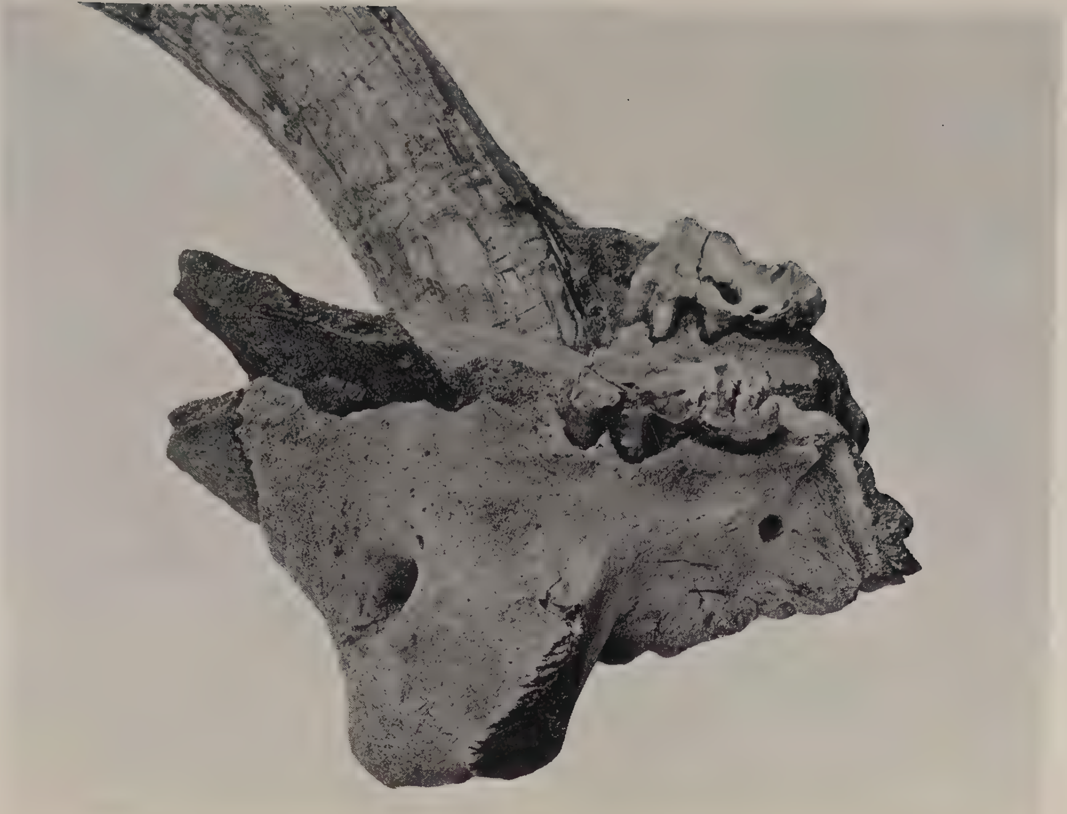
[20] N. Y. State Mus. Bul. 196, 1918, 47.

[21] N. Y. State Mus. Bul. 127, 1909, pl. 3 and Rochester Acad. Sci., 1919, v. 6, pl. 2.



Mastodon americanus. Palatal view of specimen from Ellenville, showing worn teeth of a very old animal. Note reduction of teeth to one on each side of jaw.

Westchester County

97 1906. *Hartsdale.* "A tooth[22] and some small fragments of bone were found at Hartsdale on the property of W. H. Fish." This is the only authentic record from Westchester county. A reported discovery of mastodon bones near White Plains in June 1920 is here mentioned on account of the publicity it received. The so-called bones proved to be weathered blocks of "Calciferous" sandstone.

Wyoming County

98 1876. *Pike.* A brief statement concerning this find was published by Clarke[23] in 1903 and a fuller account in 1908.[24] His later account is as follows: "I append here some additional data concerning the Pike skull taken from a recently published account (Guide to the Genesee Valley Museum, Letchworth Park, by Henry R. Howland, 1907, p. 5):

> These remains of a mastodon were found in the summer of 1876 in cutting a farm land ditch on the farm of Charles Dennis, on the outskirts of the village of Pike, which is about 7 miles from Glen Iris, and through which flows the Wiscoy creek, one of the tributaries of the Genesee river. The tusks were fortunately quite perfect and with them were found a part of the skull, some vertebrae and some foot bones. In order that these remains should be properly preserved they were at once purchased by Mr Letchworth who caused them to be mounted at the natural history establishment of Prof. Henry A. Ward in Rochester, N. Y. The prompt action taken in the matter resulted in the preservation of this valuable relic which was returned to Pike and allowed to remain on exhibition at the Pike Seminary until the completion of the Genesee Valley Museum Building in 1898. In 1904 the seminary building was destroyed by fire. The measurements of the pike Mastodon are as follows:

Length of skull, measured in a straight line from back to front	43½ inches
Length of tusks, measured along lower curve	96½ inches
Greatest circumference of the tusks	23 inches

The following additional information concerning the Pike mastodon is from a letter in the State Museum files written by C. B. Rieler to James Hall, dated Pike, N. Y., July 17, 1876: "Nearly all the bones found are more or less decomposed. None of the leg bones found have as yet been seen nor have any of the rib bones been found. The bones lay much scattered at the depth of 2 to 6 feet in a small peat bog so that digging is difficult. The result thus far is seven teeth, ten vertebrae one with a 'spine' 17 inches in length, two clavicles, one scapula, two small bones of the foot, two tusks 9 and 6 feet long respectively, and each 6¾ inches in diameter at base, and several other bones large and small, including portions of the skull."

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[22] Clarke, N. Y. State Mus., 3d Rep't of the Director, 1907, p. 60.
[23] N. Y. State Mus. Bul. 69, 1903, p. 932.
[24] N. Y. State Mus. Bul. 121, 1908, p. 45.

99 1884. *Perry.* "The Museum of the Wyoming Pioneer and Historical Association at the Silver Lake Assembly, contains two teeth [of the mastodon] found on the farm of William Olin, town of Perry, in the year indicated."[25]

100 1886. *Attica.* The following summary with references to the Attica mastodon or mammoth has been published by Clarke.[26] "Small tusk, ribs and other bones found in digging trench on Genesee street, in unlaminated clay at a depth of 2 to 3 feet, overlaid by clayey muck and loam. Beneath these bones were found several pieces of charcoal.[26a] In another part of the same swamp, under 4 feet of muck and 1 foot below level of the bones, was found a considerable quantity of charcoal with broken pottery. *Clarke. N. Y. State Geol. 6th An. Rep't, 1887, p. 34; 7th An. Rep't in N. Y. State Mus. 41st An. Rep't, 1888, p. 388.*" See also Geological Magazine (3) 1889, 6:192. Of the above references, the 41st Museum Report is best as it contains a cut showing ground plan and vertical section of the locality.

MAMMOTHS

Of the one hundred and fifteen mastodon and mammoth remains listed from New York State, fifteen have been definitely determined as those of the mammoth. With the exception of the Queensbury, Warren county, tooth, all the mammoth remains have been found in central New York and westward. The fifteen mammoth finds recorded in the list that follows are all represented by teeth, and thus generic determination is positively established. In six of the fifteen finds the teeth were accompanied by bones, thus indicating the possible presence of the whole animal.

Among the list of one hundred specimens recorded under mastodons, about thirty lack positive generic determination. Twenty of these are from southeastern New York, which thus far has revealed no mammoth remains. It is then reasonable to assume that nearly all, if actually not all, of the generically undetermined specimens from southeastern New York belong to the mastodon. It is to be regretted that the terms "elephant," "mastodon" and "mammoth" have often been used and are still used in a sense that tends to confusion. Both mastodons and mammoths are "elephant like," and moreover the word "mammoth" may be used either as an

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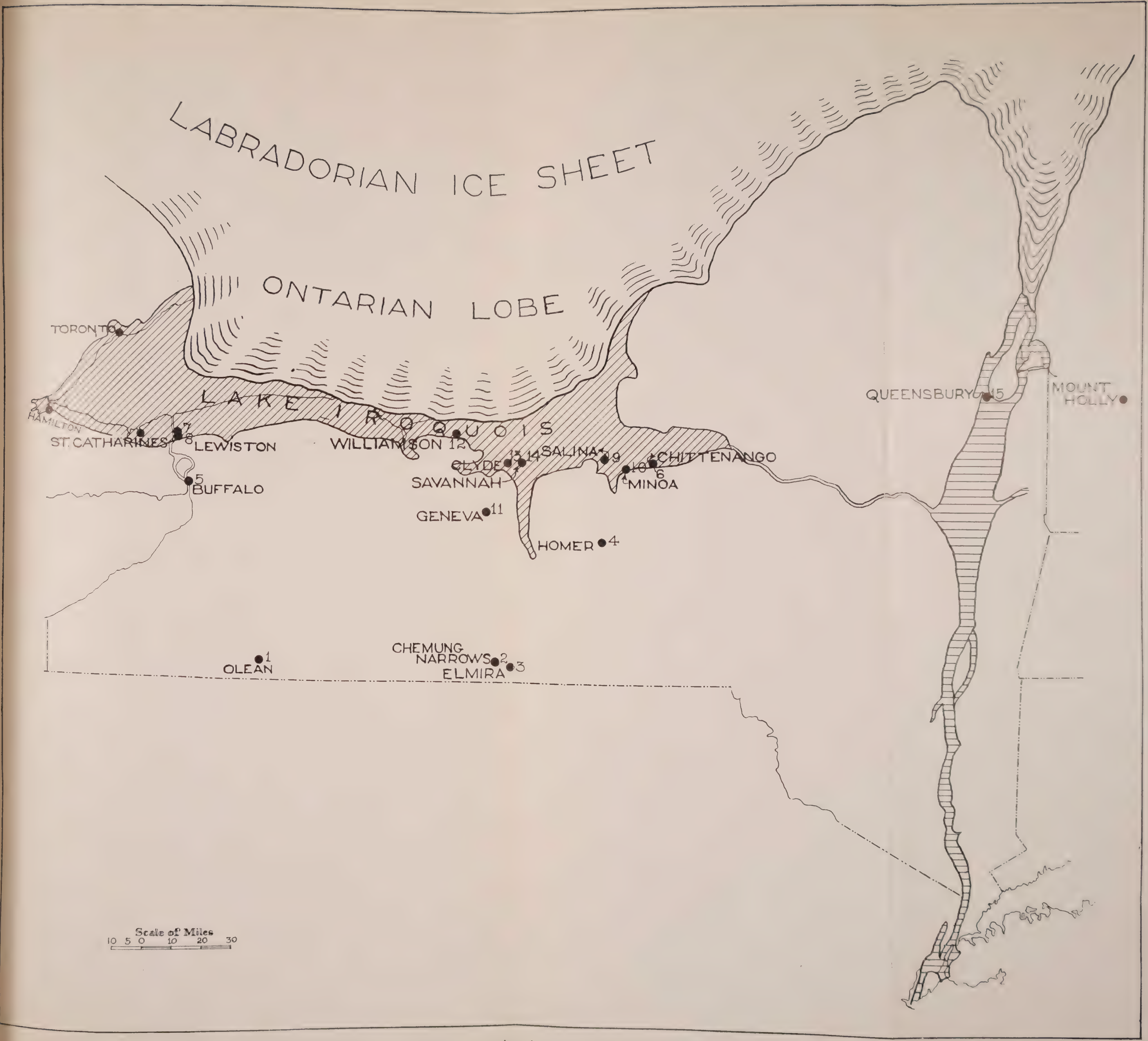
[25] Clarke, N. Y. State Mus. Bul. 140, 1910, p. 46.

[26] N. Y. State Mus. Bul. 69, 1903, p. 932.

[26a] See account of charcoal and charred wood found with cones of trees now extinct on Staten Island, under description of the New Dorp, Richmond county, mastodon.



Map showing the preponderance of mammoth remains in New York State, in the area covered by Lake Iroquois waters.

adjective or a noun. As an adjective it denotes large or huge size and was so used in America even before the word became used as an adjective in England. It is recorded that an English writer wondered why the Mammoth Cave of Kentucky was so called since no remains of the mammoth had been found there. Although the fossil elephant has been recorded from southeastern New York, it is believed that this record was due to the use of an indefinite term and that the animal was really a mastodon. In western New York about ten specimens which lack generic determination are recorded with the mastodons. In the latter section only two of the fourteen mammoth remains can be credited, and these doubtfully as having been found in swamp deposits. On the other hand, nearly all the mastodon remains have been found in swamps. The chances then greatly favor the inference that the generically undetermined proboscidian remains from swamps are of the mastodon rather than of the mammoth. Of the doubtful specimens included under the mastodons, the tusk from Pony Hollow (no. 92 Tompkins county) could, it is believed, have been placed with equal propriety with the mammoths. This was not done because only such remains as have been positively identified as mammoths are included in the list. Another doubtful specimen described with the mastodons is the Copenhagen tusk from Lewis county. If this slender tusk could be proved to belong to a mammoth, it would go far to indicate the presence of the mammoth in New York in Postglacial times. Such evidence, although eagerly sought for, has not been forthcoming. Further studies and discoveries may prove definitely the presence of the mammoth in New York since the glacial period. Such discoveries of a late mammoth may be expected since they have been found in some of the nearby states.

There is no doubt that mammoth remains were imbedded in sand and gravels laid down during recession of the ice sheet. Examples of these are best seen in the Lewiston specimens of teeth and bones which were found deeply buried in the spit formed in Lake Iroquois. The Savannah specimen is another good example, where the gravel beds in which the teeth and bones were found was formed during the period when Lake Iroquois was at a high level. The Clyde mammoth tooth was deeply buried at a still earlier time in a delta of Lake Montezuma — a lake earlier than Iroquois and in point of time corresponding more nearly to glacial Lake Warren. These three occurrences as described in the pages following are comparatively recent finds, and the data relating to them have been carefully investigated by the writers and are thoroughly reliable.

Deeply buried specimens of bones and teeth of the mammoth have also been found in the Iroquois beach in Canada[27]. At Hamilton, Ont., there is an excellent beach and bar of Iroquois age. In this bar and nearby beach are found bones, ivory and teeth of mammoths which occur at various levels from 33 feet to 70 or 80 feet above Lake Ontario. Mammoth bones with remains of trees were found in an old soil 30 feet below the gravel bar in the city of Hamilton, indicating a lower and earlier stage of Lake Iroquois before the final higher beach level was reached.

Interglacial periods have also been recognized in Canada in the vicinity of Toronto. In some of these interglacial deposits, bones of the mammoth or mastodon have been found as well as bones of the bison and Cervalces borealis.[28] It is unfortunate that the proboscidian remains have not been identified as either mammoth or mastodon, but in either case the occurrence is of interest in showing antiquity as well as the association of the bones of the bison.

Fossil mammoth teeth have also been found in the Pleistocene deposits of Ontario, at St Catharines. A number of mastodon remains are also recorded from the gravel deposits at St Catharines. Definite data regarding the finds here are lacking, and it is not known whether the mammoth and mastodon remains were associated in the same deposits or whether they were found at different levels. The figures and descriptions of some of the remains from St Catharines are contained in Ward's "Catalogue of Casts of Fossils," published in 1866.

As shown on the accompanying map, the more frequent finds of mammoth remains along the south shore of Lake Iroquois are not without significance and may have interesting bearing on the Pleistocene history.[29] The presence of these along Lake Iroquois shore can not be fully explained as the effect of more favorable burial and preservation within the belt of the rising level of Iroquois waters. Neither can it be regarded as merely fortuitous or accidental. Some causal relation must be sought. The explanation is probably found in the mechanics of the ice sheet in relation to the Ontario basin and Lake Iroquois history.

Assuming that the Canadian elephants were forced southward and some remains inclosed in the glacier while advancing over a land surface of moderate irregularity, such of the skeletal parts as survived transportation should be irregularly distributed over the glaciated territory, in this case reaching to central Pennsylvania. But the deep Ontarian valley (present Ontario basin) lying athwart the trend of ice movement introduced important modifying factors, and but few of the mammoths were carried far to the south of Lake Iroquois by the glacier.

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[27] A. P. Coleman in Guide Book 4, 12th International Geological Congress, 1913, p. 73, 74.

[28] Coleman, in The Natural History of the Toronto Region, 1913, p. 72.

[29] Prof. H. L. Fairchild has generously given the writers valuable suggestions relating to the mechanics of ice movement.

The remains of most of the Canadian animals that were overwhelmed by the glacial snows were incorporated in the lower, or ground-contact ice of the southward-moving sector of the Quebec (Labradorian) ice cap. This deepest portion of the ice sheet was pushed into the deep Ontarian valley and becoming stagnant because of its position and also of its load of detritus, it served during all the duration of the Quebec glacier as a bridge over which the upper ice, by a shearing flow, passed on south over New York. This element of glacier mechanics is fundamental to the present explanation of the peculiar distribution of the Elephas remains and is believed to describe the behavior of the continental glacier toward deep and capacious valleys, not only those transverse to the ice flow but also longitudinal valleys, especially when these decline toward the transgressing ice sheet, like the Finger Lakes valleys.

During the life of the Quebec glacier, the captured mammoth remains lay in refrigeration in the Ontarian valley, until, with the waning of the glacier, the frontal melting reached their position. Then some of them were lifted in floating ice on the waters of Lake Iroquois and were rafted to the south shore. Of these, some were buried and preserved in the deposits laid in the rising waters on the south shore, and of these a few have been discovered.

The above explanation and glacial history assumes only a single ce invasion, which is thought to be true for New York and New England. If dual glaciation is claimed, as is the case in the Toronto egion where proboscidian remains are found in interglacial deposits, he mechanical conditions would be duplicated in essential factors, but it would be necessary to repopulate southern Canada with the Elephas fauna, as the second ice advance would remove the ossils left by the first ice recession.

The history need not be complicated by postulating deep-ponded waters in the Ontarian valley during the earliest transgression by he ice (a "preglacial Iroquois") because the latter found a great iver valley of free drainage southward.

The entrapping of the mammoth remains in the deep valley of he lower ice, their release by flotation in the ice rafts of the frontal waters and the rafting of the fossils to the south shore of Lake roquois, appear to afford a reasonable explanation of the peculiar elation of the discovered fossils.

The Type Specimen of Elephas americanus *DeKay*

In 1842 DeKay[30] described and figured a tooth of a mammoth, which he called the American elephant, Elephas americanus. His description follows: "It is with some hesitation that I venture to designate, under a new name, a species founded on specimens of teeth, which appear to differ widely from any hitherto met in this country. The tooth found on the banks of the Susquehannah, near Tioga, March 1786, and figured in the Columbian Magazine, approaches it somewhat, but can scarcely be referred to the same species. The specimens above alluded to were found in a diluvial formation near the Irondiquoit river in Monroe county, 10 miles east of the city of Rochester. According to a writer in the American Journal, vol. 32, p. 377, these remains consisted of a tusk and two molars, one of which is in the Cabinet of the Lyceum, and is that figured in the plate. This is 6 inches in its greatest depth; and, as nearly as can be conjectured from the part which remains, it must have been about 8 inches long, and 3 in breadth on its grinding surface, which is, however, too much injured to exhibit the ends of the enamel. There are thirteen plates in a space of 5 inches, and they are more compressed than in any fossil species with which I am acquainted, being almost in contact, with very little interstitial substance. It is altogether different from any fossil elephant hitherto described, and merits the distinct appellation of E. americanus."

In the account of the Perinton, Monroe county, mastodon it has been pointed out that the remains from Perinton described in 1837, as "Fossil Remains of the Elephant, Elephas primigeneus," were actually those of the mastodon and that the specimen described by DeKay possibly came from without the State, or at least it was not one of the two teeth found at Perinton, because they belonged to the mastodon. The teeth found at Perinton are described as "well preserved," but both the figure and description of the elephant tooth as given by DeKay show that it was more or less decayed and a part actually missing. DeKay's type is no longer in existence, having been destroyed by fire.[31] According to the figure and measurements given by DeKay the tooth may be regarded as a synonym of Elephas primigenius.

In view of the facts above stated the Perinton locality in Monroe county is not included in the list of mammoths which follow.

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[30] Nat. Hist. N. Y.; Zool., 1842, pt 1, p. 101; pl. 32, fig. 2.

[31] Am. Mus. Novitates No. 41, July 1922, p. 1.

RECORDS OF MAMMOTH REMAINS FOUND IN NEW YORK STATE ARRANGED BY COUNTIES

Cattaraugus County

1 1889. *Olean.* About the year 1889 a molar tooth was found, with a light covering of soil over it, on the edge of a swamp near Olean creek, a short distance above its junction with the Allegany river. The junction of the two streams is at the city of Olean and the tooth was found at an elevation of 1430 feet. Measurements of the tooth show that it is about 3 inches wide, 9 inches long, about 7½ inches in height and weighs 5 pounds. The writers are indebted to Mrs Katherine E. Bradley of Olean for the above information, and mention is made of the tooth in her *historic* sketches of "The Olean Rock City" (1920, p. 20). Only a photograph of this tooth has been seen by the writers and it is provisionally identified as E. primigenius. Further study may show that it is *E. boreus* = E. jeffersonii, since the width of the ridge plates appear to agree quite closely with that species.

Chemung County

2 1872. *Chemung narrows.* In a letter dated December 30, 1872, Prof. J. Dorman Steele, noted teacher and author of Steele's Natural Science series of textbooks, wrote to Dr James Hall as follows:

> A man at the Chemung Narrows has found a tooth of the mammoth (not mastodon), very fine, weighing over 7 pounds and 13 inches in length. I have had a talk with him today. A neighbor has one also about the same size. . . . It is probable that there are more to be found in the same spot as they have already picked up pieces of the jaw-bone.

A portion of a tooth from Chemung Narrows is among the collections of the State Museum and is recorded as an accession in the 37th Report of the State Museum for 1883 (1884), page 28. It is not known whether this specimen represents an additional find to that mentioned in Steele's letter or whether it is a broken part of one of the two teeth mentioned.

3 Date? *Elmira.* A catalogue in the American Museum of Natural History has the following entry: "E. primigenius. River gravels, Elmira, N. Y. Presented by D. W. Payn. Part of a molar." Further details concerning the finding of this specimen are lacking. Dr O. P. Hay[32] recorded this tooth under the name

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[32] Science, 1919, 49:378.

E. columbi, but according to the definition of the species by Prof. H. F. Osborn,[33] it belongs to his recently described E. jeffersonii.

Cortland County

4 1847. *Homer.* According to the original description by Woodworth,[34] the tooth (plates 14, 15), was " found in the bank of a small stream, about 2 miles north-west of the village of Homer. The stream had washed away a portion of the bank, and left a part of the tooth exposed, lying about 20 inches below the surface, in an alluvial formation, resting on a base of gravel."

In the Report of the North Carolina Geological Survey (1848, page 200), E. Emmons gives a figure of the Homer tooth. He states: " But to those who have marl beds, to identify its remains a tooth (fig. 24) of this interesting animal is given in the margin. It is a reduced figure of one found in the superficial deposits of New York." The Homer tooth, which is in the State Museum, has been identified by Dr O. P. Hay as E. columbi.

Erie County

5 1921. *Buffalo.* (E. primigenius.) In November 1921, a large tooth of a mammoth was obtained at a depth of 50 feet while dredging for sand in the middle of the Niagara river opposite Black Rock, Buffalo. The tooth is in the Museum of the Buffalo Society of Natural Sciences, and Director William L. Bryant writes that the tooth belonged to the northern mammoth. Three or four other teeth were observed by the workmen of the sand dredge, but only one was saved by one of the laborers, whose curiosity was aroused and who took the tooth to the museum.

Madison County

6 1825. *Chittenango.* (E. primigenius.) Some remains of a mammoth were discovered during the excavation of the Erie canal, which was completed in 1825, or possibly they were found

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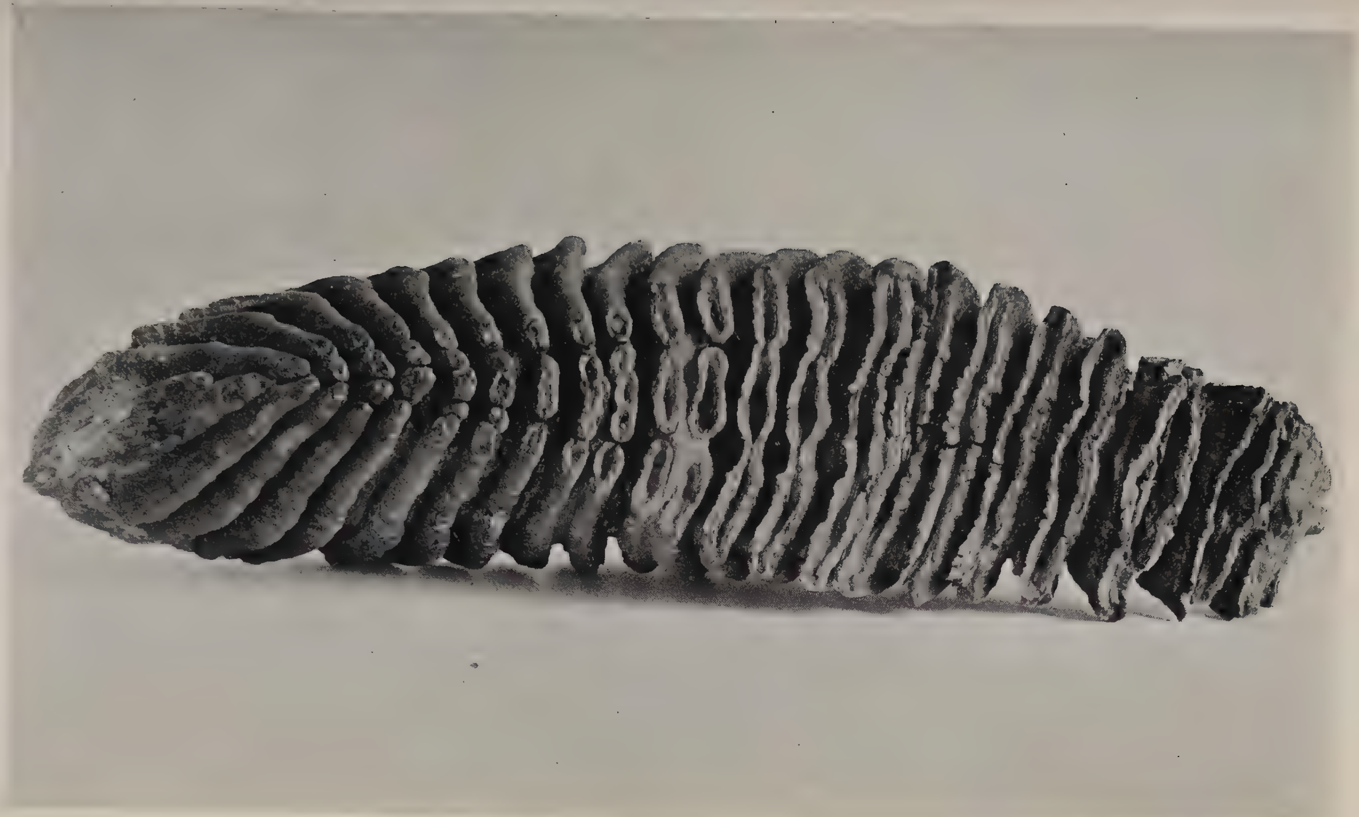
[33] Am. Mus. Novitates, no. 41, July 1922, p. 11.

[34] Samuel Woodworth, Amer. Jour. of Agri. and Sci., 1847, 6:31–37, fig. 1. Description of a Tooth of the Elephas Americanus. See also the following:

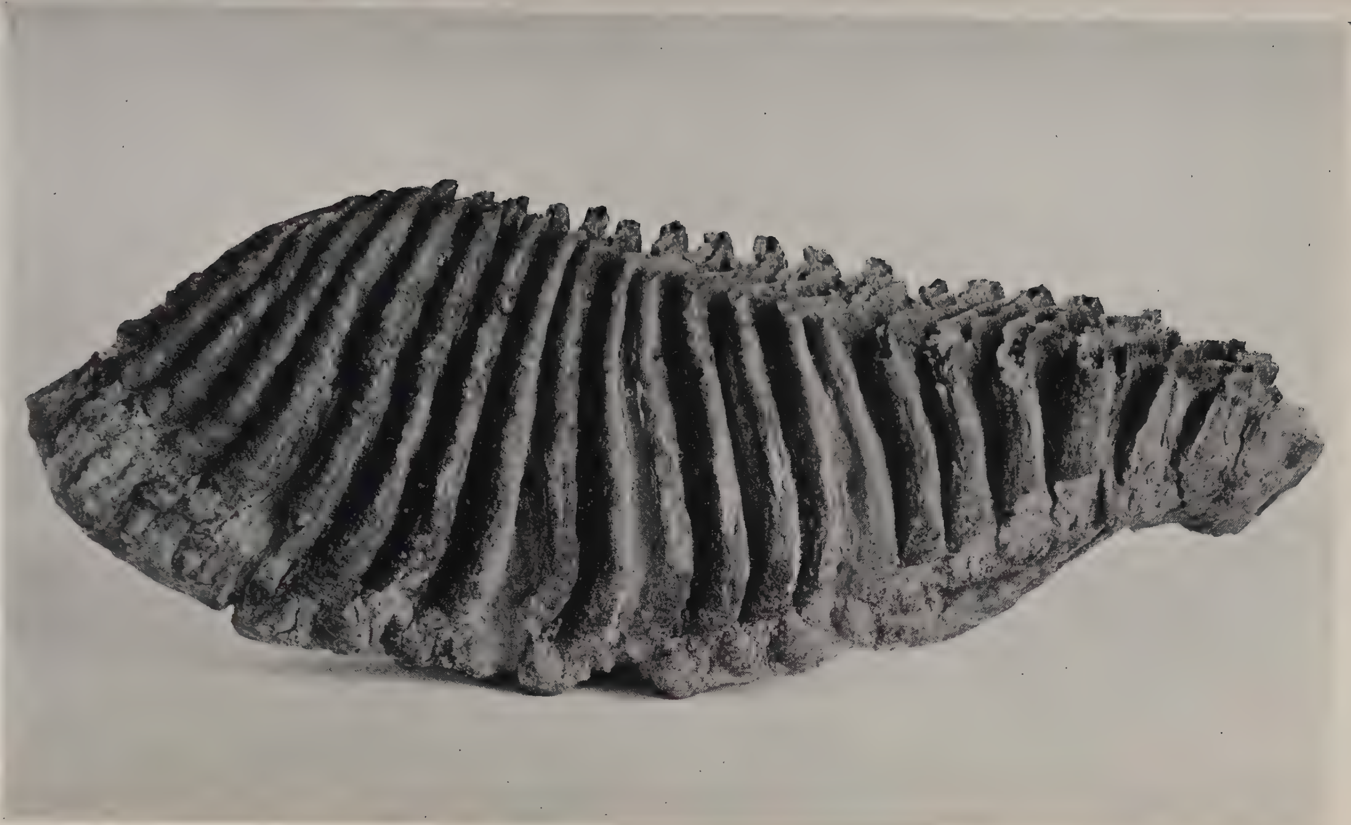
1854. Caleb Green, 7th Annual Rep't, State Cabinet Nat. Hist., appendix A, p. 16; letter to John Gebhard jr, states tooth was found in summer of 1847.

1859. Twelfth Annual Rep't, State Cabinet Nat. Hist., p. 109. Records gift of the tooth to the State Museum from trustees of Homer Academy.

1918. J. M. Clarke, N. Y. State Mus. Bul. 196, p. 47. Of the two teeth mentioned by Clarke, only the one figured by Woodworth can be identified with certainty.



Top view of molar of mammoth found in 1847 at Homer, N. Y.



Side view of the Homer mammoth tooth.

during the enlargement of the canal at a somewhat later date. It is not known how many of the remains were found for the various parts were carried away by collectors. Some of these are now in the State Museum and were acquired through efforts to bring together in one place as many of the remains as possible. The following statement with list shows the parts that were brought together for the museum.

> The Regents are indebted to the following gentlemen for their assistance in procuring the remains of a fossil elephant, exhumed near Chittenango, in excavating the canal:
>
> To James Stewart, Esq., of Amsterdam, for a tusk, tooth, vertebrae, ribs, and bones of the foot.
>
> To H. C. Merrick, Esq., Civil Engineer of Cortland, for a tusk and ribs
> To Prof. A. K. Eaton, of Clinton, for ribs, etc.
> To Charles Van Eppes, Esq., of Sullivan, for a tooth.
> To James Coleman, of Sullivan, for a tooth and ribs.
> To Mr Robert Wilson, of Chittenango, for a part of the underjaw.[35]

Unfortunately we do not possess detailed information of the circumstances attending the find or a section showing the character of the material in which the remains were embedded. The portion of the jaw is excellently preserved. So are the parts of the tusks, the missing portions having been cut and sawed away. The jaw is clean and not discolored. It shows little sign of decay and has the appearance of having been found in sand or gravel, although the blue clay, still attached to the rough broken part and in the nerve channels, indicates that the specimen was found either in blue clay or else came in contact with it after excavation.

The elevation of the Erie canal in the vicinity of Chittenango is about 420 feet, and it lies within the province of glacial Lake Iroquois. Nearly the whole of the region north to Oneida lake is a low flat country, with here and there some drift material appearing above the general level of the country, and near the line of the canal there are glacial channels showing the Vernon red shales of the Salina beds.

The drift material and the Pre-Iroquois channel through which the canal passes near Chittenango have been described by Fairchild,[36] and as the mammoth remains seem likely not to have been found outside of the limits of the drift and channel his description of them is here incorporated:

> In the midst of the embayment at Chittenango is a great mass of morainal drift overlying rock which has a very prominent bank on the

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[35] Tenth Annual Rep't, State Cabinet Nat. Hist. for 1855 (1857), p. 188–190.

[36] 21st Rep't State Geol. for 1901 (1903), p. 142. See also topographic map, pl. 9, for location of drift area and glacial channel. Also N. Y. State Mus. Bul. 127, 1909, pl. 4.

northwest flank (see pl. 24). South of, or behind, this islandlike mass is a large river channel about the dimensions of the Syracuse channel. Whether the floor is rock or alluvium has not been determined, but in either case the form and surface are due to the sweeping by a great river before the ice had opened a passage north of the outlying hill. The canal follows the north side of the broad channel.

Niagara County

7 and 8 1912. *Lewiston.* (E. primigenius.) Plate 10, upper figure. In 1912, parts of the remains of two mammoths were found in a large sand and gravel pit of a terrace not more than 40 rods north of the New York Central Railroad station at Lewiston. The finding of two nearly perfect atlases indicates that the bones represent at least two animals. Altogether about 35 pieces of bones were found, many of which are too badly broken or crumbled to be identified. Some of the bones show the effect of being moved about with the sand and gravel as they are water-woven. Among the bones that can be recognized are the pelvis, two or three broken ribs, one vertebra, some foot bones and the beach-worn joints of some of the larger leg bones. Of the teeth, one complete molar (plate 17) and parts of two other molars were found. According to Frank Lonsdale, pit foreman, who collected the remains and from whom they were obtained for the State Museum, the bones were found in several layers of sand and gravel aggregating 6 to 10 feet in thickness and 20 to 40 feet below the original flat top of the terrace, but the actual depth below the surface at the point where found was not less than 20 feet. The filling of the place where the bones were found made the exact determination of depth impossible when the gravel pit was later visited. As the surface of the filled hole was 20 feet below the top of the pit, actual depth at which the higher bones were found must have been at least 20 feet; and as they were scattered in layers 6 to 10 feet thick some of the bones must have come from a depth of at least 26 feet and possibly from a depth of 30 feet. On account of the bearing which the age of the gravels in which the bones were found has to the age in which the mammoths lived, the following geological history of the sand and gravel deposits at Lewiston is given:[37]

> *Spits.*— The larger gravel pits just north of the landing at Lewiston show one of the most remarkable sections of Pleistocene gravel to be seen in the region. The beds are of clean gravel and include some coarse layers con-

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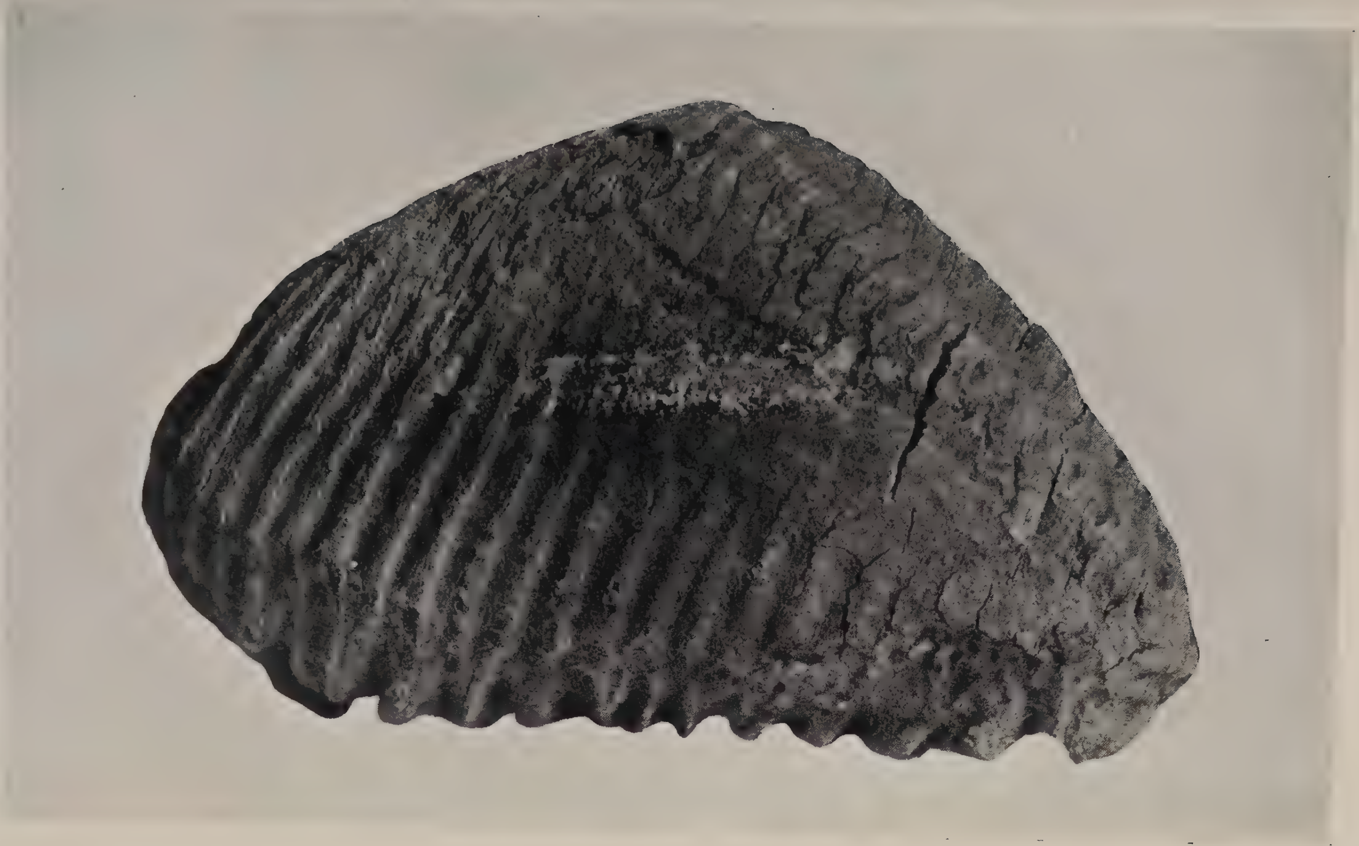
[37] Kindle and Taylor. U. S. G. S., Niagara Folio, no. 190 (1913), p. 13. See also Geol. Sur. Can. Guide Book No. 4, 12th International Congress, 1913, p. 65–68.



A mammoth tooth from gravels of glacial lake Iroquois, Lewiston, N. Y.

sisting of large pebbles with no filling between them. Fine and coarse layers alternate in sharply defined beds. Some of the stones are 8 to 12 inches in diameter. Most of the material is well rounded, but some of the larger stones are not, their edges and angles retaining some prominence. The gravel is bedded, the beds dipping steeply southeastward, in some places nearly south, in others nearly east, and there is almost no evidence of ordinary cross-bedding. Only in one or two places has even the slightest discordance of bedding been observed. The most remarkable aspect of the deposit is the depth of the gravel and the depth to which the inclined beds go without break or change. At times the exposure has shown individual beds running to a depth of 40 feet and the bottom was not then exposed. A considerable part of the gravel is cemented into a hard conglomerate. The deposit appears to be thickest at the pits, but it extends northward along the bank of the river for half a mile or more, thinning out in that direction. On the surface the beds give no evidence of their presence except that the ground is stony and sandy; their surface is merely a part of the surf-worn plain lying in front of the Iroquois beach. . . . The ridge of the Iroquois beach or spit that runs west through the village of Lewiston comes to the bank of the river at the gravel pits and unconformably overlies the coarse, steeply inclined beds. The beach is composed of fine gravel or coarse sand, entirely unlike the material of the inclined beds.

Some of the characteristics of the coarse gravel suggested at first that it may be a bar of initial Lewiston torrent, but excavations have gone on more rapidly in the last 5 years and the new exposures, coupled with the finding of the bones of a mastodon at a depth of 18 to 20 feet in the gravel, seem to show that it is of Iroquois age. Gravel was drifted along shore from the east and was built into a large spit that pushed out into the deep water of Niagara river and at its west end hooked around to the south. The inclined beds shown in the pits appear to have been built off the south end of the hook or on the rear side of a subaqueous bar. The work was done mainly soon after the level of Lake Iroquois was raised from the Newfane level and probably in part during the transition, the spit during that time migrating up the slope. As the shore line was cut farther into the land the upper part of the older gravel was cut off.

The location of the deposits of sand and gravel of the Lewiston spit is well shown on the map (Niagara gorge) of the folio above cited, and under the legend is the statement "Coarse spit gravel (deposited as spits by waves and currents when lake was rising from Newfane to Iroquois beach level, 20 to 40 feet thick)."

Onondaga County

9 1867. *Salina.* (E. primigenius.) In 1867 the State Museum received as a donation from Ira A. Gilchrist[38] of Salina "part of a fossil elephant's tooth, from the gravel of Salina. The section showed a depth of 15 feet above the point where two elephant's teeth are said to have been taken out." The tooth in the Museum is light in color. We have no information relative to the two teeth said to have been obtained 15 feet deeper. Part of another tooth in the Museum may have come from this locality but we have no positive evidence as the label is old and may have been misplaced.

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[38] N. Y. State Cabinet Nat. Hist., 21st Annual Rep't, 1871, p. 16.

The origin of the deposits of Salina, which are on the east side of Onondaga lake, has been given by Fairchild[39] as follows: "The delta sand plain on which stands the city of Syracuse and the plains east and west of Onondaga lake were probably mostly laid in the early Iroquois waters, and at about 110 feet above the sea."

10 1883. *Minoa.* (E. primigenius). About 1883, during the construction of the West Shore Railroad, some remains of a mammoth were unearthed at Manlius Station (now Minoa). According to a statement of the late Prof. John D. Wilson of Syracuse, some bones, broken pieces of tusks and a molar were found. The bones were so fragile that none was collected, but the molar and portions of a tusk or tusks were obtained. The parts collected were obtained by Mr John Cunningham and are now in the geological department of Syracuse University and have been described by Dr Burnett Smith,[40] who writes:

> The molar is of interest on account of its approach to that of the southern mammoth (Elephas columbi Falconer). In the number and character of its enamel ridges it undoubtedly presents some resemblance to the teeth of E. columbi but it is nevertheless probably referable to the northern form.[41] The tusk possesses a diameter of about 180 mm near the base, while the molar, which is from the left side of the lower jaw, measures 250 mm on a grinding surface which is incomplete through breakage.
>
> The specimens indicate a large individual and it is indeed unfortunate that we have only meager records of its horizon and of the material in which it was found. Mr. Cunningham has assured the writer that the position of these remains was quite superficial. An inspection of the locality leads to the belief that the specimens could not have been unearthed much, if at all, above the 400 foot contour. A few fragments of vegetable matter are still adherent on the tusk but the unstained condition of all the specimens makes it unlikely that true peat was the inclosing deposit.
>
> Both tusk and molar are now in a very friable condition but this, by itself, can hardly be advanced as a certain sign of great antiquity. We are dealing with an extinct animal, it is true, yet no evidence has so far appeared to prove indubitably its reference to any system of deposits differing materially in age from those which included the other mammalian remains considered in this paper.

From the above account it is evident that the remains did not come from a peat bog and so it is very probable that they were obtained from sand or gravel. The locality is just within the province of glacial Lake Iroquois and nearby are several earlier glacial channels,[42] indicating that the remains may have been found in deposits laid down by glacial waters.

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[39] Rochester Acad. Sci. Proc., 1919, 6:40.

[40] N. Y. State Mus. Bul. 171, 1914, p. 68.

[41] Dr O. P. Hay and Dr W. K. Gregory have both examined photographs of this specimen and have very generously given the author the benefit of their opinions on its specific position.

[42] N. Y. State Mus. Bul. 127, 1909, pl. 4 (pocket) and N. Y. State Geol. 21st Annual Rep't, 1903, pls. 8, 9.

Ontario County

11 1847. *Geneva.* (Species?) In the account of the Homer mammoth tooth by Samuel Woodworth,[43] Principal of Homer Academy, he states, " we possess a tooth or cast of a tooth of the elephant from Seneca lake near Geneva." As Geneva is on Seneca lake, the above tooth is undoubtedly the one referred to 11 years later by E. Emmons,[44] who states that " a tooth belonging to the elephant was taken from the beach upon Seneca lake, New York." The figure given by Emmons agrees with the Homer specimen, and as we have not seen the Geneva specimen or a figure of it we are unable to place it specifically.

Wayne County

12 1908. *Williamson.* (E. primigenius.) The mammoth tooth from the town of Williamson, in the museum of the University of Rochester, has been identified by Dr O. P. Hay as the lower left last molar. The tooth is practically complete and dark in color, having the appearance of having been found in swamp or muck material. The specimen was received at the museum about 1908. The town of Williamson lies northeast of Macedon, where mastodon teeth were found, and the higher and closing level of the Iroquois beach passes through the town in an east and west direction. Prof. H. L. Fairchild has informed the writers that the locality is northeast from the village of Williamson and that the tooth came from the province of glacial Lake Iroquois, a short distance north of the beach of this glacial lake.

13 1910. *Clyde.* (E. primigenius). During the construction of the state Barge canal, a tooth of a mammoth was found near Clyde in October 1910. The tooth was on exhibition for a short time in one of the store windows at Lyons and was presented to the Museum by William B. Landreth, deputy state engineer. A letter from B. F. Failing, resident engineer at Lyons, written shortly after the tooth was found, states, " The mammoth tooth was found while excavating for lock 26, Barge canal, 2½ miles east of Clyde, N. Y. It was found about 100 feet from the Clyde river and 22 feet underground in a layer of sand and clay, on top of gravel which

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[43] Amer. Jour. of Agri. and Sci., 1847, 6:35.
[44] Rep't of North Carolina Geol. Sur., 1858, p. 200.

appears to have been the old river bottom." The elevation of the surface of these deposits are 400 feet, and as the tooth was obtained 22 feet below the surface it was found at an elevation of 378 feet.

These sand and gravel deposits, which are really to the southeast of Clyde, are of delta formation and were formed by the escaping waters of glacial Lake Dawson, which poured through the Fairport channel and built its delta near Clyde in the waters of glacial Lake Montezuma, an initial body of water, which later became a part of and belonged to the province of the larger glacial Lake Iroquois. The depth, the known character and the history of the deposits in which the Clyde specimen was found, stamp its age, the tooth having been imbedded during Lake Dawson time and while Lake Iroquois was still in its infancy, the latter lake at this time extending only over the Syracuse-Rome area.

The Clyde delta was formed by the same waters flowing from glacial Lake Dawson as were the glacial deposits in which the mastodon teeth were probably found at Macedon, 24 miles farther west from the mouth of this glacial river which terminated near Clyde. The Clyde delta is well shown on[45] Fairchild's maps as are also the deposits at Macedon and those at Perinton where mastodon remains were found.

14 1916. *Savannah.* (E. primigenius). The remains of this mammoth were dug from a gravel pit on the west side of a drumlin 1 mile northwest of Savannah. The parts recovered include two teeth, shoulder blade, fragments of the leg bones and foot bones. Fragments of a tusk were also observed but these were not collected. The drumlin is an isolated one upon which the waters of glacial Lake Iroquois built a spit in which the gravel bed was opened. The elevation of the gravel bed is about 30 feet above the surrounding marshes. The nearest drumlin is more than one-fourth of a mile away. Chadwick[46] states, "There is every reason to believe, nevertheless, that the bones were buried in these beach gravels by the waves themselves, and at the time when Lake Iroquois was at its full height. In no other way could they have become so interstratified with the beach shingle." The evidence presented gives us

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[45] N. Y. State Mus. Bul. 127, 1909, pl. 3, and also Rochester Acad. Sci. 1919, Proc. v. 6, pls. 2, 3.

[46] More complete details of this find are given by Prof. G. H. Chadwick in N. Y. State Mus. Bul. 196, 1918, p. 44-46. The account is accompanied with detailed maps and sketches.

very clearly the geological time when the remains were embedded, but it does not tell us whether the mammoth was living in New York at that time or whether the remains belonged to an earlier period and were rafted to the drumlin frozen in the ice. The latter view appears the more plausible.

Warren County

15 1860. *Queensbury.* Since 1911, when the Holden collection was presented to the State, there has been in possession of the Museum a single molar (plate 18) of a mammoth from this county. The tooth had long been in the geological collection of Dr A. W. Holden of Glens Falls. The date of the finding of the tooth has not been definitely determined but it was probably sometime previous to 1860. In a letter from the late Dr J. A. Holden written in 1918, he states: "The tooth which during the days of my youth reposed carefully under a glass case in my father's office at Glens Falls, was found on the farm of one John Harris in Upper Queensbury, N. Y., during, as I now remember it although I will not be absolutely certain, an excavation for a well or cellar." Upper Queensbury is the northern part of Queensbury township, and borders Lake George at the lake's southern tip and for a few miles along its eastern shore.

Unfortunately we do not possess exact information concerning the character of the deposits or the depth at which the tooth was found. If the tooth was found in an excavation for a cellar or a well, it is quite evident that it was not obtained from a peat bog or swampy ground. If it was obtained from a cellar excavation, the depth at which it was found was probably less than 6 feet, but if found in a well excavation, it may have occurred at a much greater depth. The Queensbury mammoth tooth is of special interest on account of being the only proboscidian relic thus far found in northeastern New York. This tooth has been identified by Dr O. P. Hay as E. primigenius. It has thin enamel but in distance between ridge plates approaches *E. boreus* Hay = E. jeffersonii Osborn.

Both sides of the valley in which the Queensbury tooth was found are bordered by rather steep ridges of Precambrian gneisses of the southeastern Adirondacks, although the valley floor is made up of Ordovician rocks. The elevation of the valley does not rise much above 400 feet, and in its lower reaches it is near the level of Lake George, which has an elevation of 323 feet. This valley, which now has a northern drainage into Lake George, in Pleistocene time (Lakes Dawson and Iroquois age) was occupied by southward-flowing glacial waters derived from the melting Labradorian ice lobe, which projected into this region. These waters were carried over the present divide between Lake George and the Hudson river at Glens Falls and into the Hudson valley drainage. Above Albany the waters were met by the waters from the melting ice of western New York and beyond. After the establishment of the divide west of Little Falls, all the waters of glacial Lake Iroquois were carried north of the Adirondacks and into the Hudson river valley by way of the Champlain valley. At a still later time the region where the mammoth tooth was found was covered by the waters of the Gilbert gulf age, known as the Champlain sea which was at ocean level. Whether the mammoth tooth was buried in the deposits laid down by glacial waters or possibly in deposits in the later Gilbert gulf can not be definitely stated. In light of other mammoth finds in New York State, it seems more probable that the tooth was derived from glacial ice and buried in glacial deposits, but if it was derived from Gilbert gulf sediments, it stamps its age as more recent, and as the only trace of the mammoth found in the Champlain deposits. It is to be regretted that more definite details of this isolated find are lacking since with our present knowledge it is impossible to determine between the alternatives above given as to the age of the deposits in which the tooth was found imbedded.

In this connection it may be well to note that in Vermont,[47] in the township of Mount Holly, 45 miles east of Queensbury, some remains of a fossil elephant were found resting on a bed of gravel which was covered with 9 feet of muck. The place was close to the divide between the Champlain and Connecticut valleys, and at an elevation of 1360 feet, or nearly 1000 feet higher than the place where the Queensbury specimen was found. The Vermont specimen has been identified by Doctor Leidy[48] as E. americanus (E. primigenius). This find seems to show clearly that this animal was postglacial, but no such conclusive evidence has thus far been found in any of the New York records.

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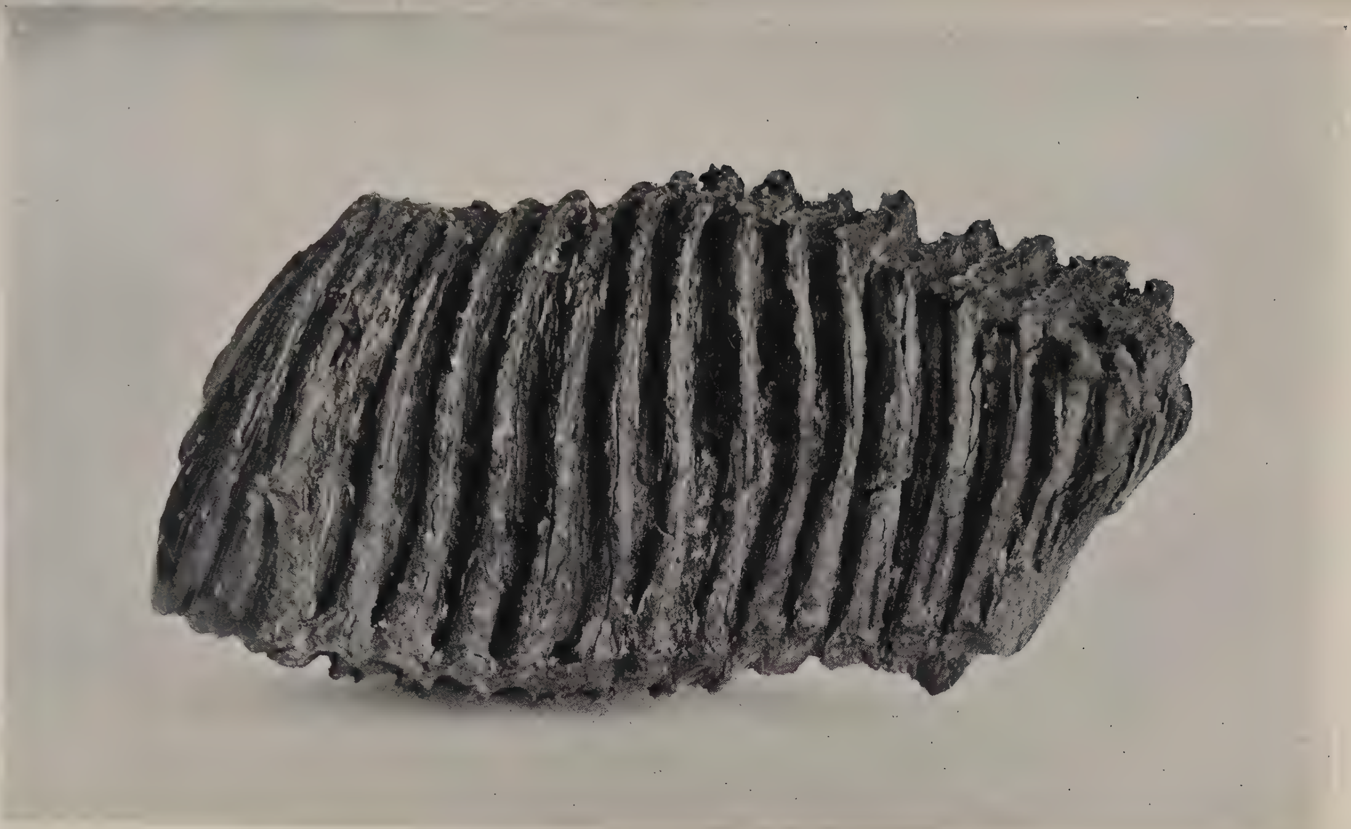
[47] Appendix to Thompson's Vermont, 1853, p. 14-15.

[48] Acad. Nat. Sci. Phil., Proc., 1885, 7:392.



The mammoth tooth from Queensbury, Warren county, N. Y.

OTHER MAMMALIAN REMAINS

Vulpes sp. **Fox**

W. C. Redfield[49] in a brief account of mammal remains from Broome county, New York, mentioned the discovery of bones which he ascribed to the genus Vulpes. They were said to have been found in clay beneath drift, on the Delaware-Susquehanna divide near the New York-Pennsylvania state line.

> In the autumn of 1848 . . . [W. C. Redfield] received from Major Brown, engineer in chief of the New York and Erie Railroad, the lower jaw and other bones of this mammal, partly inclosed in a matrix of fine clay, in which material the whole had evidently been embedded. These bones had been obtained by Mr Jonathan Case, in excavating for the line of railway at the Gulf Summit, in Broome county, N. Y., at a depth of 40 feet below the natural surface, at an elevation of 1375 feet above tide. The incumbent materials consisted, mainly, of gravelly clay and fragments of the native rock which belongs to the Hamilton group of the New York geologists, and are such as constitute the greater portion of the drift in that region.

The account states that a careful examination of the ground in the vicinity gave no evidence that the bones had been buried by a slide of surface materials; that the remains were of a true fossil character was further evidenced by finding in the incumbent materials, a fragment of Corniferous (Onondaga) limestone, the outcrop of which was 70 miles distant from the locality where the bones were discovered.

Ursus sp. **Fossil Bear**

Excavations at Monroe, Orange county, in 1901 for the purpose of recovering remains of a mastodon discovered first in 1888, brought to light the proximal half of a femur of a large bear comparable in size and conformation to that of a grizzly. Specific determination is impossible owing to the fragmentary condition of he remains, but the size of the bone excludes the possibility of its aving belonged to the common black bear. It was found deep in he muck of the pond bottom associated with remains of a mastodon nd a horse.[50]

Ursus americanius Pallas **Black Bear** (Plate 19)

W. M. Smallwood[51] reported briefly on the discovery in 1903 of he remains of five or more bears with bones of deer from the vicinity of Onondaga lake. Smallwood was of the opinion that these remains were of comparatively recent origin but Burnett Smith[52] in giving an account of the same specimens expressed the belief that they were of considerable antiquity. Smith states, " . . . all the bones were secured during excavations which reached from the surface through the peaty layers into the marl below. The specimens were found immediately above the marl at a depth of about 10 feet. Even allowing for the sinking of heavy carcasses through soft material, one is justified in assuming a considerable antiquity for remains found in such deposits at that depth." Plate 19 is reproduced from Museum Bulletin 171.

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[49] Amer. Assn. Adv. Sci., 1850, p. 255–56.
[50] Clarke and Matthew, Bul. Geol. Soc. Amer., 1920, 31:204.
[51] Science, n. s. 1903, 18:26–27.

The bones recovered consisted of "two skulls, three mandibles, two left mandibular rami, three left humeri, two right humeri, one left tibia, one right tibia and one right fibula."

Cystophora cristata Erxleben **Seal**

"In 1901 the New York State Museum received from Dr D. S. Kellogg, Plattsburg, New York, the tibia of a seal which had been recovered in October of that year from the postglacial clays within the city limits. The bone was found at a depth of 11 feet below the surface during the construction of a sewer trench on Bailey avenue. The soil at this locality was said to consist of a layer of sand 4 or 5 feet thick overlying fine clay. Fossil marine shells, Macoma greenlandica (*Beck*), were abundant in the upper part of the layer of clay but none were found at the depth of the imbedded bone.

"The specimen has been examined by Mr Remington Kellogg of the Biological Survey and the following statements quoted from a recent letter will indicate its affinities. A young individual of Cystophora cristata (no. 14013, U. S. N. M.) from Newfoundland . . . shows a very close approach to the fossil tibia. The lower extremity is approximately the same, including the facet for the fibula. The curvature of shaft and angle formed by the suture for the epiphysis of head, same as in C. cristata. The shaft of the tibia of the fossil specimen is a little thicker in the median region than is the condition in C. cristata. Although similar in essential characteristics to the recent specimen with which it was compared, it is perhaps best, on account of the fragmentary condition of the remains, to record the bone as the left

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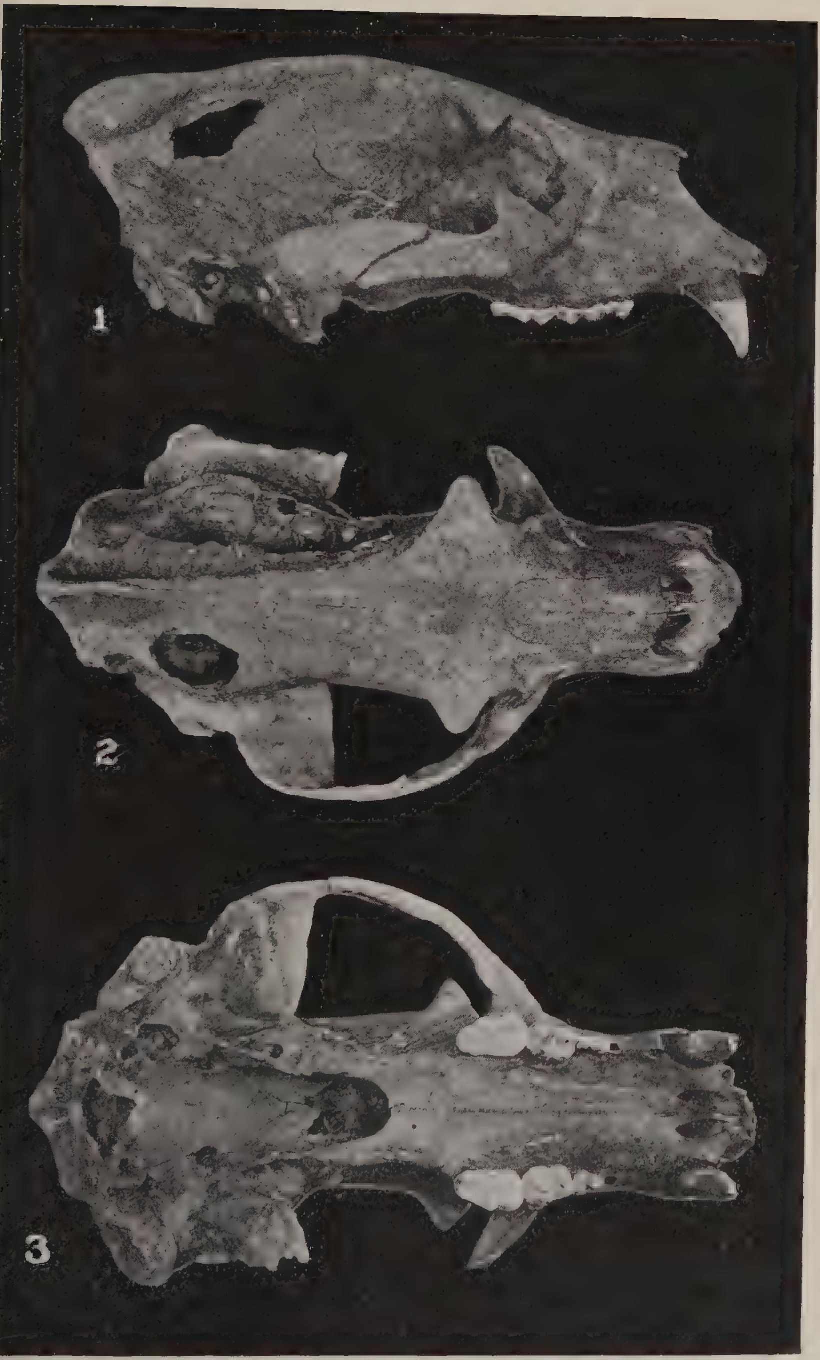
[52] N. Y. State Mus. Bul. 171, 1914, p. 65, 2 pl.

Plate 19



Three views of cranium of black bear (*Ursus americanus*) from Ley creek, Onondaga Lake, near Syracuse, N. Y. (After Burnett Smith.)

tibia of a fossil phocid near Cystophora cristata *Erxleb.*"[53]

This fossil had its origin in the Pleistocene sea which overspread the area now occupied by Lake Champlain and the adjacent parts of New York and Vermont and is doubtless of the same age as the remains of the fossil cetacean unearthed in August 1849 on the Vermont side of the lake, 12 miles south of Burlington and about 1 mile east of the lake shore.[54]

Castoroides ohioensis Foster **Fossil Giant Beaver**

The remains of this giant rodent were first discovered in Ohio associated with the bones and teeth of *Mastodon, Elephas, Ovis* and other mammals. S. R. Hildreth[55] presented the earliest account of the species but failed to give it a name; this was later supplied by the geologist, J. W. Foster.[56]

In New York State remains have been found in two localities. The first were discovered (1845) in a swamp on the farm of Gen. W. H. Adams of Clyde, during the construction of a canal extending from Sodus bay, Lake Ontario, to the Erie canal about 1 mile west of the village. The well-preserved cranium is now in the New York State Museum (plates 20, 21).

The geological position of the fossil was fully discussed by James Hall,[57] who stated in part: "The situation in which it was found is an elevated plateau or level tract of land . . . the whole surface [of which] is covered by a peaty soil. . . . This elevated ground is the summit level, from which the waters flow in opposite directions, into Lake Ontario on the north, and into the Clyde river, and thence into Cayuga and Seneca lake outlets on the south. The precise locality of the fossil was near the termination of a shallow ravine, or the bed of a small stream, which flows into Lake Ontario, in a northeasterly direction."

A section at the locality presented the following characters from he top down:

"1st. Muck, or vegetable soil . . . 2 feet or more in thickness.

"2d. Fine sand, with occasional thin bands of clay, often conisting of alternating layers of sand, twigs, leaves and other fragments of vegetable matter; . . . 2 to 3 feet thick.

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[53] S. C. Bishop, Jour. of Mammalogy, 1921, 2:170.
[54] Zadock Thompson, Amer. Jour. Sci., 2d ser., 1850, 9:257.
[55] Amer. Jour. Sci., 1837, 31:80–81, figs. 15–18.
[56] Geol. Surv. Ohio, 2d Annual Rep't, 1838, p. 80–81.
[57] Bost. Jour. Nat. Hist. 1846, 5:385–91, 3 pl.

"3d. Muck or peaty soil, . . . inclosing trunks of trees of large size, about 4 feet thick."

The cranium of Castoroides rested on a layer of fine sand 2 or 3 feet thick, beneath which occurred drift containing boulders and fragments of sand and limestones from a locality a few miles farther north.

Among the fragments of fossil wood, in the layer above that on which the cranium rested, were found pieces showing plainly the marks of beaver teeth but whether these were of the recent species or of Castoroides was not determined. The Rev. Benjamin Hale of Geneva, N. Y., from whom the specimen was received, stated in a letter dated November 1845, that specimens of charred wood and charcoal were also discovered in the layer above the cranium. An anatomical description of the specimen by Jeffries Wyman follows Hall's account in the same journal.

In Ohio, as before mentioned, and in Indiana, Louisiana and Tennessee, Castoroides bones were found mingled with those of mastodons, elephants and other animals. Mastodons or elephants have not been recorded from the precise localities of New York specimens of the giant beaver but they have been found in deposits of like character and at practically the same level. Remains of the recent beaver have also been found with those of the extinct one.[58]

An account of the discovery of a lower left incisor tooth of Castoroides in the town of Lenox, Madison county, has been given by Burnett Smith.[59] In this instance the tooth was embedded in a layer of bluish clay overlain by the following materials:

1. The surface materials consisting of about 2 feet of sandy soil and artificial fill.
2. About 6 inches of muck.
3. Marl, 2 to 6 inches.
4. One to 1½ feet of clay with peaty bands.

Castoroides is distinctly an American species with the general proportions of the recent beaver and bulk of the black bear. Its grinding teeth, however, resemble those of the South American Capybara (Hydrochoerus) and more remotely, those of Chinchilla.

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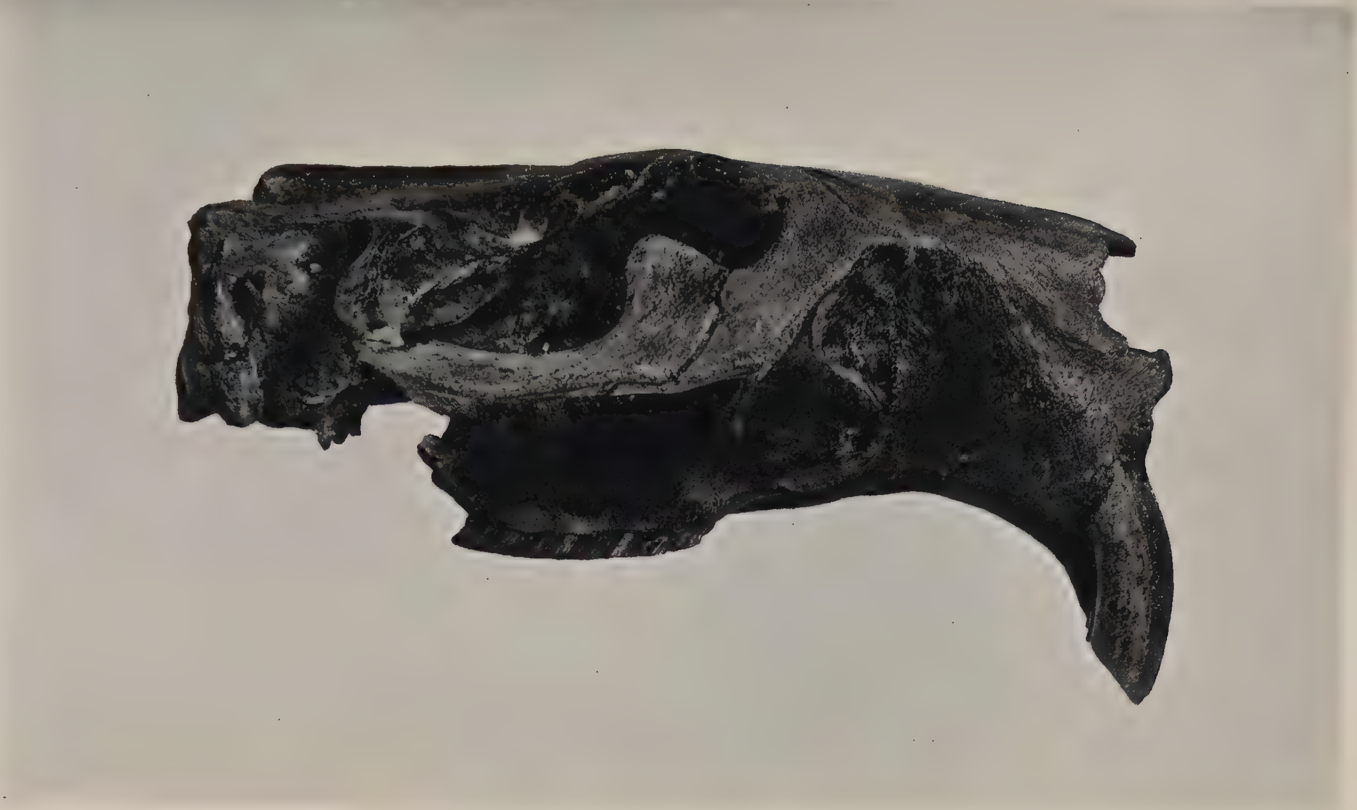
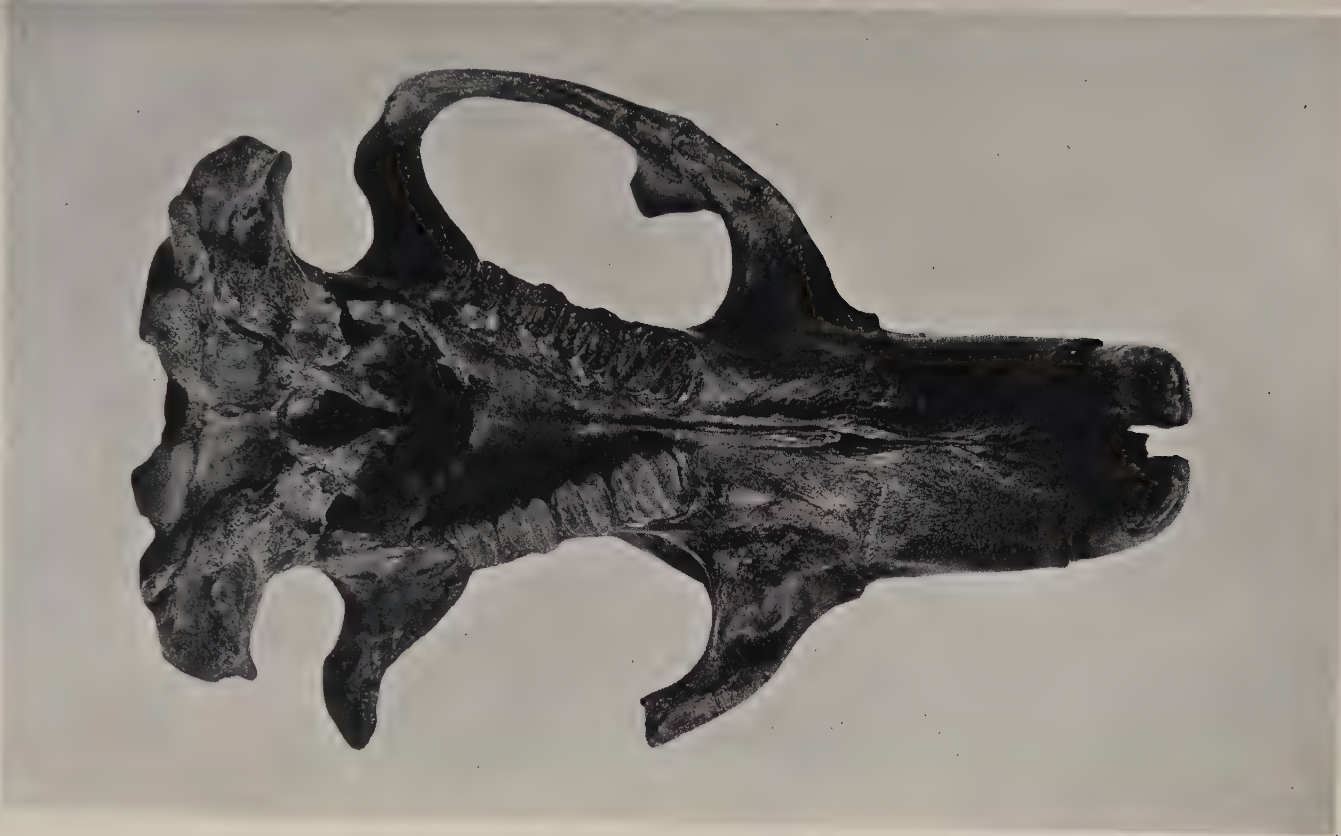
[58] Proc. Bost. Soc. Nat. Hist, 1848, 2:138.
[59] Amer. Jour. Sci. 1914, 38:463–66.



Giant beaver (*Castoroides ohioensis*). Side view of cranium from Clyde, N. Y.



Giant beaver (*Castoroides ohioensis*). Palatal view of cranium from Clyde, N. Y.

Platygonus compressus LeConte **Fossil Peccary**

An account of the first discovery of remains of Platygonus ompressus is given by John L. Le Conte,[60] who described he species from portions of a skeleton found in the lead regions f Illinois. In New York State parts of four individuals have been ound, two from a gravel bank a few miles from Rochester, the thers from a gravel bed on the farm of James Russell near Gainesille, Wyoming county, in 1912.

The Rochester remains are in the possession of the Academy of atural Sciences of Philadelphia and the following account is taken rom that of Leidy:[61] "Recently the writer procured through purhase for the Academy of Nat. Sci. of Philadelphia . . . a ollection of remarkably well-preserved remains of two adult indiiduals of Platygonus compressus which were found n making a railway excavation in a gravel bank a few miles rom Rochester. Of one individual there is the greater part of ne skeleton, consisting of the nearly perfect skull with the eeth . . . 21 vertebrae, the sacrum, the long bones of both airs of limbs, the imperfect scapulae, an innominatum, and part f a second, both pairs of principal metacarpals, one pair of prinpal metatarsals, an astragalus, a calcaneum, portions of a sternum nd fragments of three ribs. Of the second individual there is a ss perfect skull with the upper teeth but without the mandible." he above account is also quoted by G. S. Miller.[62]

"The material from Gainesville belongs to two individuals, and onsists of two skulls, remains of five ribs, five vertebrae, two apulae, one left and one right, two metacarpals, one innominate, ne ilium, one radius, and ulna and two tibias. Of the two skulls, ne is complete; in the other the lower jaw is missing. The comete one belongs to an older individual, and the incomplete one to younger, though grown specimen, which still has the temporary olar teeth"[63] (plates 22, 23).

The remains were purchased for the State Museum in 1914 from P. Barrett of Gainesville.

The position of the hill or drumlin from which the bones were tained, is shown on the Portage topographic map by a small conur circle one-third of a mile northwest of Gainesville. The larger atures of the hill are shown on the sketch map (plate 24).

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[60] Amer. Jour. Sci., ser. 2, 1848, 5:102-3.

[61] Wagner Free Inst. of Phila., Tran. 1889, 2:41-50, pl. 8, fig. 1.

[62] N. Y. State Mus. Bul. 29, 1899, p. 372.

[63] Clarke, N. Y. State Mus. Bul. 187, 1916, p. 34.

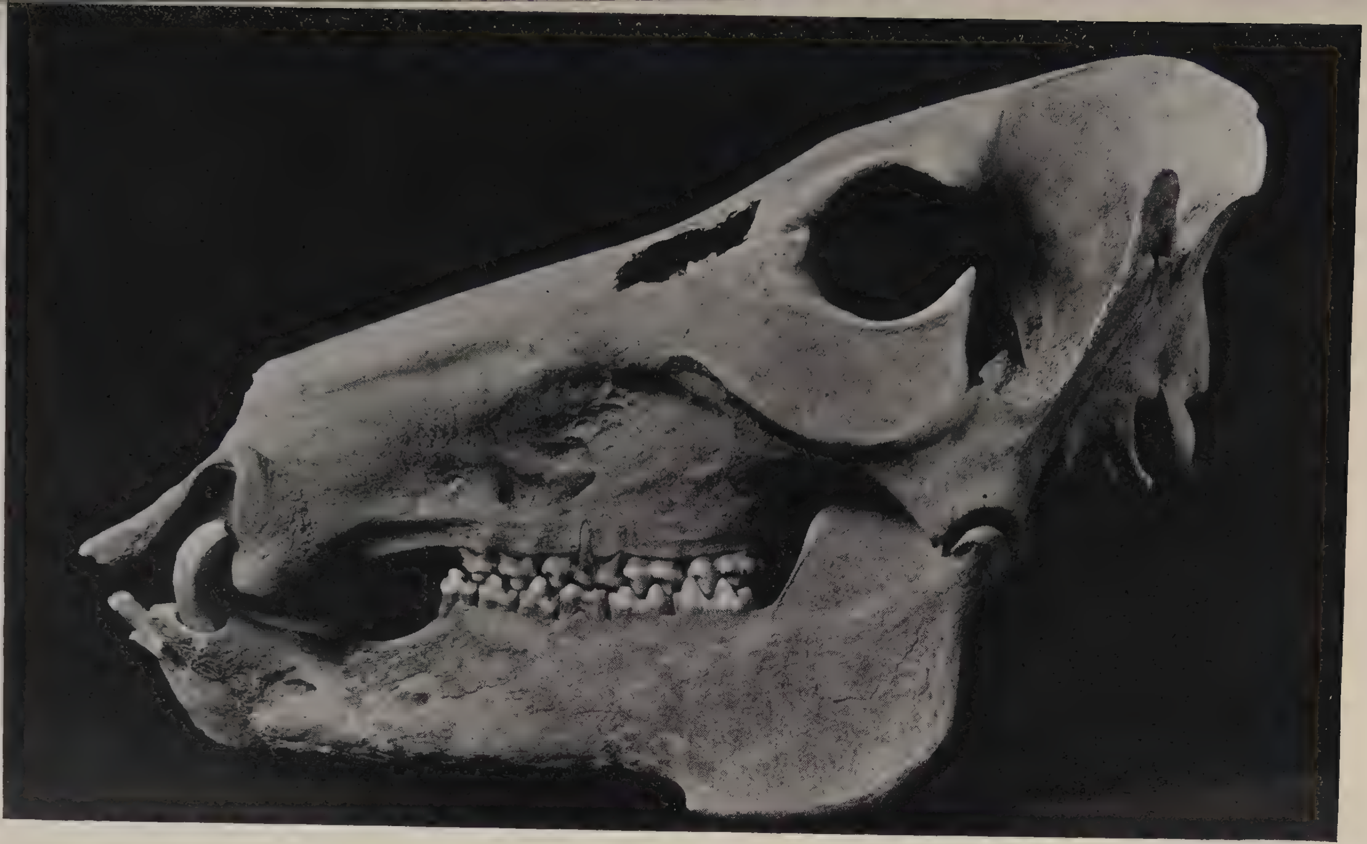
At the gravel bed where the bones were found in a pocket of sand, besides sand and gravel, pebbles of all sizes occur up to 1 foot in diameter, those of 3 to 4 inches in diameter being most abundant. They include granite and granitic schist, Medina sandstone, Clinton limestone, Onondaga limestone and chert, some light colored quartzite, local Portage rock and some pieces of shale, usually concretion-like in shape, from which the outer shell readily scales off. A rock with small vertical fucoids is also found, probably "Calciferous" limestone. There is no indication of stratification or assortment by water, although the pebbles are often well rounded and water-worn.

The form of the hill is that of a drumlin, which may have been slightly modified by later glacial waters. The west and north slopes are the steepest with the highest point near the north end. The south slope is less steep than the north and the east is a gentle decline. To the south as far as East Koy creek the plain is almost level. This is not regarded as a lake bottom, although floods from melting glacial ice may have surrounded the hill and reworked some of the material which was redeposited as a sand and gravel bar at the south end of the hill. The present shape of the hill suggests that some modifications have taken place since it was built by the ice, and the presence of the sand pocket in which the bones were said to have been found, may be due to this modification, or more likely, a readvance of the ice built the major part of the drumlin above the deposit in which the bones had already become embedded. In other words the remains of the peccaries may be interglacial. The bones were buried to a depth of at least 10 feet and near the level of the plain. One letter received states that the "bones were found at a depth of perhaps 30 feet below the surface."

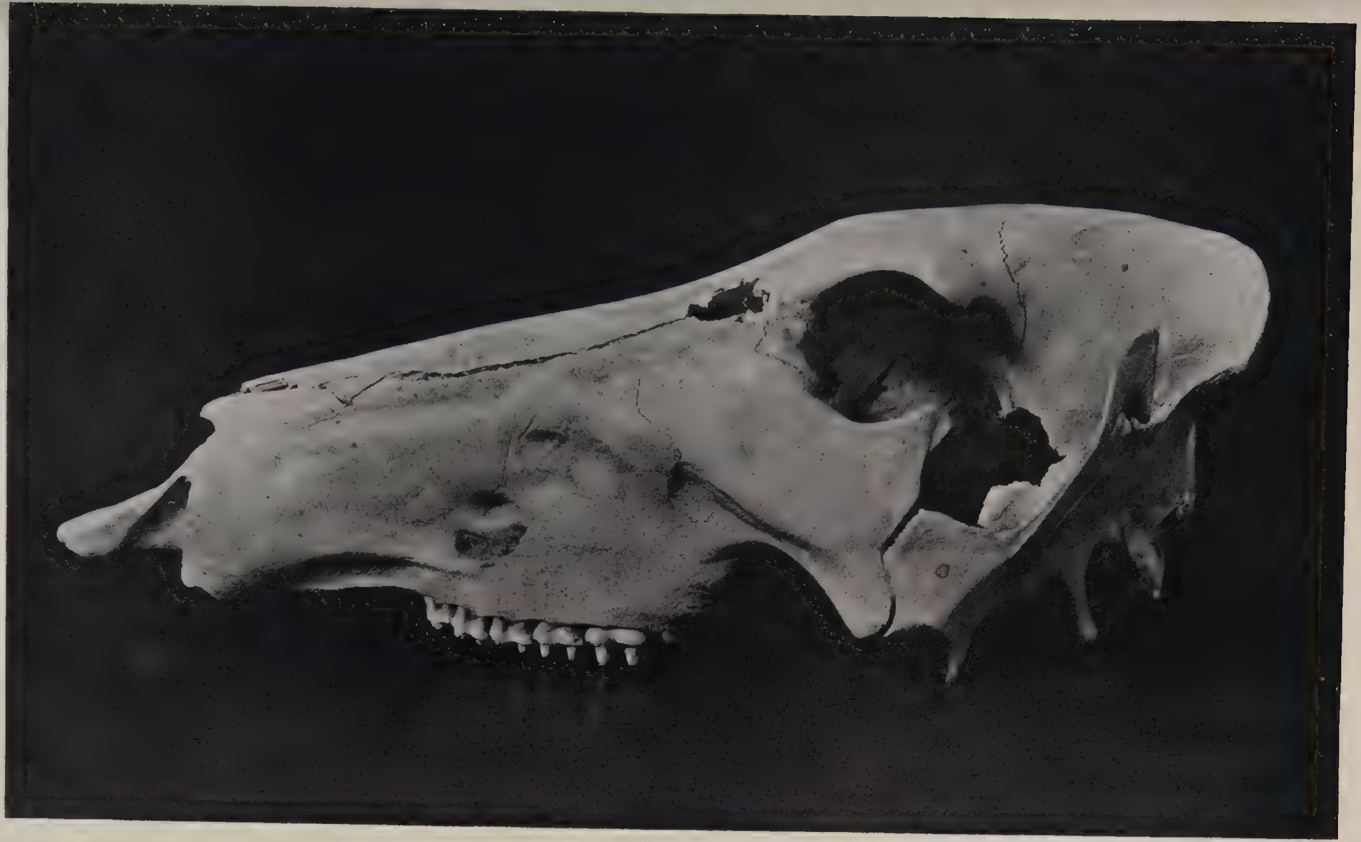
The peccaries are indigenous to America and have as relatives several living species which range from Texas through Mexico to Central and South America.

Odocoileus sp. **Deer**

Remains of deer have been recovered from peat bogs, muck and marl deposits in many parts of the State, and while in some instances the situations have been such as to preclude the possibility of recent origin, in many cases the material has had every indication of being newly buried. The finds here recorded are regarded a being of true fossil character.

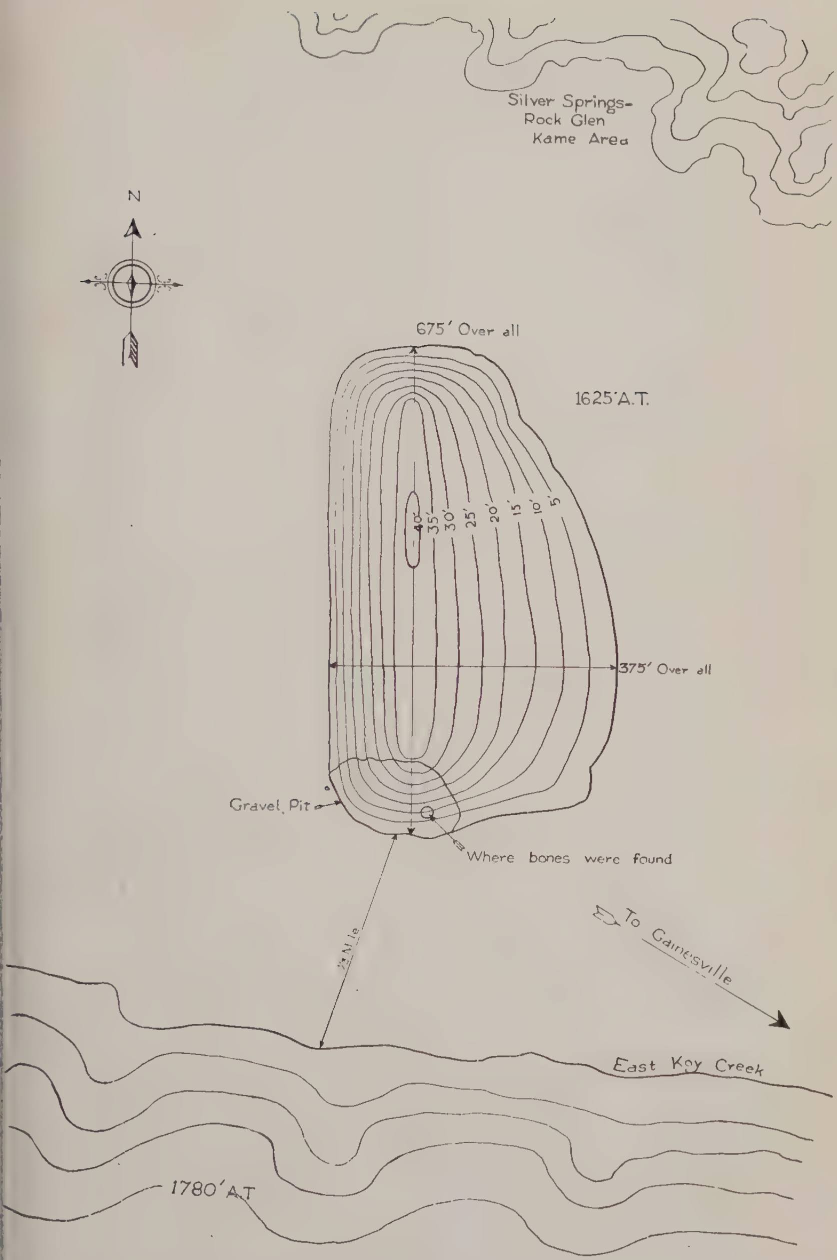


Cranium and lower jaw of peccary (*Platygonus compressus*) from Gainesville, N. Y.



Cranium of peccary (*Platygonus compressus*) from Gainesville. Found in same excavation as the one shown in preceding plate.

Plate 24



Sketch map of hill (drumlin) at Gainesville, N. Y., showing location of sand and gravel pit where remains of peccaries (*Platygonus*) were found.

A part of the upper jaw of a deer with the premolars and molars of one side well preserved, was recovered in 1908 from the muck of a swamp at Cedar Hill, Albany county. The specimen was found by J. H. Baumer in a position well below the present surface of the swamp and the condition of the bone and teeth give evidence of its being long interred.

"At Hinsdale, Cattaraugus county . . . some horns of deer, were found 16 feet beneath the surface, in gravel and sand."[64]

James Hall[65] in his account of Castoroides, mentions the finding of the jaw and teeth of a deer in a swamp, with the bones of a mastodon, in Greenville, Greene county; and in the same account (page 391) states that, "several deers' horns and the horn of an elk were found 12 feet below the surface, in a muck deposit" at New Hudson, 4 miles from Cuba, N. Y. Hall,[66] also records deer remains from Cattaraugus county, found in a sand and gravel deposit and associated with mastodon bones.

The antlers of two deer were found in marl at the cement plant at Caledonia in 1902. The antlers came into the plant with marl for the drier so that their exact position in the deposit is not known.

Remains of three or more individuals were found on the north side of Ley creek, east shore of Onondaga lake, and briefly described by W. M. Smallwood.[67] A more extended account was given by Burnett Smith[68]: "The bones were secured during excavations which reached from the surface through the peaty layers into the marl below. The specimens were found immediately above the marl t a depth of about 10 feet." Some of the specimens had shell paricles adhering to them and perhaps came from the marl itself. The emains consisted of "two large humeri each accompanied by its orresponding radius and ulna, two small humeri, one metacarpus, ix ribs, one lumbar vertebra, one thoracic vertebra and one atlas."

At another locality, Harbor brook, Syracuse, fragments of deer ones were discovered during sewer construction in 1912. "A sewer xcavation in the Harbor Brook valley cut down through the swamp eposits to a depth of from 10 to 15 feet. The layers of different aterials exhibited a variable and irregular structure but in general ie normal sequence of such deposits could be observed. That is, bluish clay occurred below, followed by marly bands which in turn were overlaid by peaty layers." One left metacarpus, one right metacarpus and antler fragments with adhering particles of shells were found." Burnett Smith, ibid.

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[64] Hall. Nat. Hist. N. Y., Geol., pt 4, 1843, p. 364.

[65] Bost. Jour. Nat Hist., 1846, 5:390.

[66] Nat. Hist. N. Y. Geol., pt 4, 1843, p. 366.

[67] Science, n. s. 1908, 18:26.

[68] N. Y. State Mus. Bul. 171, 1914, p. 65.

Mitchill[69] records the finding of fragments of two deers' horns a short distance below the surface of the ground in Stuyvesant street, New York city.

Cervus canadensis (Erxleben) **Elk**

Under the name Elaphus americans, "Fossil stag," DeKay[70] gave a description and measurements of "a portion of a pair of horns attached to a fragment of skull, dug up near the mouth of Raquet river in this State." Joseph Leidy,[71] in 1869, pointed out the identity of this specimen with the common elk and later, C. Hart Merriam[72] expressed the same opinion, basing his conclusion on the comparative measurements given by DeKay. A horn of the second year's growth from Grand Isle, Vermont, which was also referred by DeKay to his fossil species, has since been shown to belong to the elk.[73] A single tooth from Chautauqua county, mentioned and figured by DeKay and placed provisionally under this species, will be discussed under Cervalces.

Merriam (ibid) noted specimens of antlers from Steel's Corners St Lawrence county, and two sections of horns, "ploughed up in an old beaver meadow in Diana, Lewis Co."

Hall[74] records the discovery of an elk horn in a muck deposit a the summit level of the Genesee Valley canal near New Hudson 4 miles from Cuba, N. Y. These, with several deer's horns, were found at a depth of 12 feet below the surface.

In 1886, about two-thirds of the entire skeleton of an elk wa taken from the muck of a swamp in the northern part of the town of Farmington, Ontario county.[75]

In the account of the mastodon from Seneca, Ontario county mention is made of the discovery in 1885, of part of an antler o an elk at a depth of 3 feet below the surface and beneath a deposi of marl and diatomaceous earth.[76]

G. S. Miller, quoting from a letter of Dr Fred F. Drury, give an account of a pair of elk horns dug up on a farm about 4 miles from Gouverneur, St Lawrence county, in 1898. " They were accidentally discovered while digging out a spring hole in a pasture to provide water for cattle during the dry season. One horn is in perfect state of preservation, the other has been influenced somewhat by exposure, but not enough to in any way destroy the symmetry. The perfect one measures from root to tip 39 inches, and biggest circumference 8¼ inches. They each have five prongs, and when placed in approximate apposition have at widest point a spread of 34 inches opposite biggest prong." [77]

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[69] Cat. Organic Remains, New York, 1826.

[70] DeKay, Nat. Hist. N. Y., Zool. pt 1, 1842, p. 120.

[71] Acad. Nat. Sci. Phil. Jour., 1869, 7:377.

[72] Mammals of Adirondacks, 1886, p. 144.

[73] Letter of G. H. Perkins, dated Jan. 17, 1898.

[74] Hall, Nat. Hist. N. Y., Geol. pt 4, 1843, p. 367.

[75] Clarke, 6th Annual Rep't, State Geol. N. Y. 1887, p. 39.

[76] N. Y. State Mus. Bul. 69, 1903, p. 931.

A single horn dug from a bog at Cananderago, Otsego county, is recorded by Mitchill.[78]

In the muck, above the clay in which the Attica, Wyoming county, mastodon remains were resting, the ankle bones of a large ruminant, probably an elk, were found in 1887.[79]

Near the outlet of Cassadaga lake, Chautauqua county, about 20 miles south of Dunkirk, a skeleton of an elk was found in marl overlaid by muck. The exact circumstances of the discovery are not known but the bones were found sometime before 1907 and were for a time in the possession of Mr Obed Edson.

The basal portions of a pair of large shed antlers from a swamp near Beekmantown Corners, Clinton county, were found by Joseph Ouimette in 1887 and recently loaned to the State Museum for study by Prof. George H. Hudson of Plattsburg. These horns give no indication of having been water-worn and the tines, except one, are roughly broken at the tips. An interesting abnormality, evidently the result of fracture while in the velvet, is presented in one of the brow tines which is almost twice the diameter of the corresponding member.

These horns may be regarded as fossil only in the sense that they were dug from the ground and belonged to animals now extinct within the State. It is likely that they were dropped where found within the last century.

Rangifer sp. **Caribou**

The earliest notice of the discovery of remains of caribou in New York that has come to our attention, is given in an article by Ebenezer Emmons, entitled "The Lost Races." [80] After a dissertation of some length on the extermination of animals in general, the writer continues: "We have been led into the foregoing train of thought, by the discovery of the remains of a species of deer in the freshwater marl beds of Orange and Greene counties in this State. We first obtained the jaw of this extinct species from a marl pit of Mr. Stewart in the latter county, and afterwards one of the horns from a similar pit in Scotchtown in Orange. This deer was about the size of the reindeer of the north, and like that animal, was provided with a flattened (though more slender) horn; but it differs specifically from the reindeer, in the possession of two brow antlers instead of one, on a single shaft, and quite near its base. No other bones have yet been found, and hence the height and bulk of the animal have not been accurately determined; but that in this country the genus Cervus contained a species which is now extinct, is by this discovery placed beyond a doubt." The antlers found were probably those of the barren ground species, Rangifer arcticus (Richardson).

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[77] N. Y. State Mus. Bul. 29, 1899, p. 302.
[78] Mitchill, Cat. Organic Remains, N. Y. 1826.
[79] Clarke, N. Y. State Mus. 41st Annual Rep't, 1888, p. 389.
[80] Amer. Jour. of Agr. and Sci., 1845, 2:201.

The deciduous horns of all the deer family are subject to great individual variation due in part to the age and condition of the animal during the period of growth of the horns and, to a less extent, caused by injuries received while in the velvet. The anomalous development of two brow tines on a single shaft has therefore no more significance than other abnormalities of like character and could scarcely be considered sufficient grounds for the erection of a species.[81]

An account of the finding of an antler of a caribou at Sing Sing is given in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1860, 11:194 under the date of August 23d. It is as follows: "Dr Leidy read a letter from Dr G. J. Fisher, dated at Sing Sing, N. Y., giving an account of an antler of the reindeer, which had been found in the vicinity of the place mentioned. The specimen was discovered in excavating a peat bed, at a depth of 6 feet from the surface. The peat bed is almost an acre in extent, surrounded by high ground, and looks as if it had been the site of an ancient lake. Dr Leidy observed that there is a similar specimen of an antler of the reindeer in the museum of the academy which had been found near Vincentown, New Jersey, at a depth of 4 feet. . . ."

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[81] Rep't North Carolina Geol. Surv., 1858, p. 200.

Alces americanus Jardine **Moose**

Bones of the moose were recovered from a buried pothole of the greater Mohawk channel near West Waterford in December 1909 and deposited in the State Museum. The exact locality of this pothole, one of twenty-five or thirty encountered during excavation of the barge canal between locks 5 and 6, is recorded on blue-prints at the State Engineer's office, at a point 200 feet east of the end of lock 6 between guide piers 19 and 24. Two to 4 feet of soil and residual clay cover the rock surface at this point.

The largest of the potholes measured 16 by 20 feet at the surface and was excavated to a depth of 14 feet. At this point the bones were recovered and with them cones of the white spruce (Picea canadensis), Sphagnum moss, pieces of wood and shells belonging to the genus Planorbis. This find was recorded by Clarke,[82] who regarded the potholes as being similar in origin and date to those on the Mohawk at Cohoes in one of which the Cohoes mastodon was found.

The bones recovered consist of the entire set of cervical and six dorsal vertebrae and portions of six ribs of one side; their occurrence in the pothole presupposes deposition in the flesh or at least while held together by ligaments; other bones, fragments of ribs about a foot long, were said to have been found in several of the potholes excavated.

Cervalces scotti? Lydekker

Remains that can be positively assigned to this species have not een recorded from New York localities. Emmons,[83] however, decribed a tooth from a clay deposit in Chautauqua county, that may elong here. DeKay[84] figured this tooth and gave an account under is discussion of the "fossil stag," Elaphus americanus. The figure and measurements given by DeKay indicate a tooth omewhat larger than the corresponding member of a large bull elk, nd differing otherwise in the absence of the column which, in the ooth of the elk, is usually well developed between the two lobes on he inner side.

References to the literature of Cervalces in O. P. Hay's atalogue[85] include DeKay's Elaphus (in part) and doubtless efer to this tooth.

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[82] N. Y. State Mus. Bul. 140, 1909, p. 46.
[83] Rep't on the Quadrupeds of Mass. 1840, p. 82–83.
[84] Nat. Hist. N. Y., Zool. pt 1, 1842, p. 120–21, pl. 29, fig. 1.
[85] U. S. Geol. Surv. Bul. 179, 1902, p. 685.

The fourth edition of Dana's Manual of Geology[86] describes and figures the almost complete skeleton of Cervalces found in New Jersey, but incorrectly records the specimen from Warren county, New York.

Bison bison (Linnaeus) **American bison**

J. A. Allen[87] carefully examined the historical evidence of the former occurrence of the bison in northeastern North America and stated that he " failed to find a single mention of the occurrence of this animal within the present limits of New York, New England, Canada . . . that will bear a critical examination." Allen also pointed out that bison remains had not been found in the Indian shell-mounds of the Atlantic coast. The statement quoted is somewhat modified in a later paragraph by the remark that there was fair evidence of the buffalo having ranged as far east as western New York. Several earlier writers asserted, apparently without a careful examination of the evidence, that bison were formerly to be found along the entire Atlantic seaboard from New York to Florida. Although the historical accounts are, at best, misleading and indefinite, the more recent discovery of remains of bison in postglacial deposits and in the graves and refuse pits of the Indians prove conclusively that the former range of this animal extended not only to western New York but occasionally through the central counties to the Hudson river.

As early as 1835 mention is made of fossil teeth and bones found 10 feet below the surface, in muck overlaid with gravel, at Jamestown near the outlet of Chautauqua lake. The teeth were submitted to Professor Knight of Yale who identified them as probably belonging to the buffalo; and his conclusion is substantiated by the measurements and descriptions given, and by the fact that they were too deeply buried to belong to a domestic animal.[88]

A brief notice of the discovery of a bison skull at Syracuse was given by Underwood.[89] It was said to have been found at a depth of 10 feet below the surface of the ground at the junction of deposits of black swamp muck and clay. Burnett Smith,[90] referring to this specimen (plate 25) and quoting its owner, Mr John Cunningham of Syracuse, " Places the depth at 17 feet and the position

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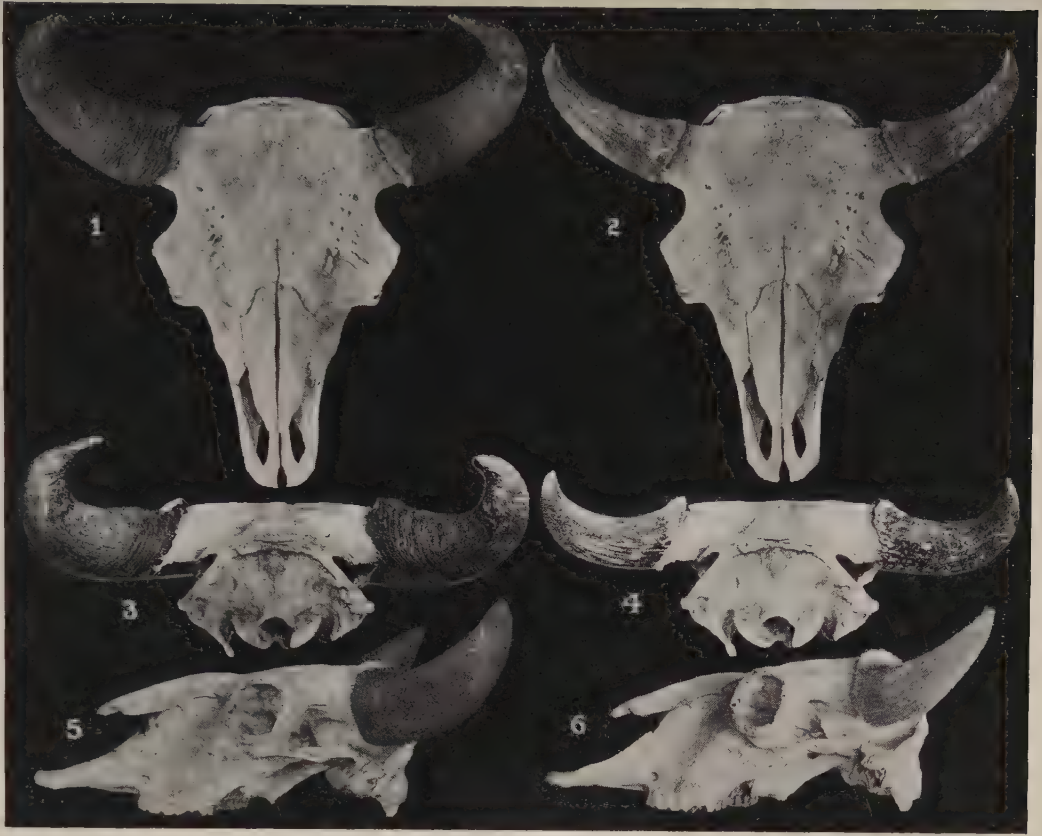
[86] Manual of Geol., 4th ed., 1895, p. 999.
[87] Mem. Mus. Comp. Zool., 1876, 4:1–246.
[88] Amer. Jour. Sci., 1835, 27:167–68.
[89] Amer. Nat., 1890, 24:953–54.
[90] N. Y. State Mus. Bul. 171, 1914, p. 67–68.



Buffalo (*Bison bison*) skull from Syracuse, N. Y. Views at right show horn-cores without horns. (After Burnett Smith.)

as below the muck, and adds that fragments of shells were found adhering to the horn cores."

Smith (ibid) also quotes part of the story related by Thomas Ashe[91] as evidence of the former abundance of the bison at Syracuse. Ashe says, in part: "The native animals of the country too, as the buffalo, elk, deer etc. are well known to pay periodical visits to saline springs and lakes, bathing and washing in them, and drinking the water till they are hardly able to remove from the vicinity. The best roads to the Onondaga from all parts, are the buffalo tracks; so called from having been observed to be made by the buffalos in their annual visitations to the lake from their pasture grounds." But as Allen (ibid) has pointed out, the region about Onondaga was well known as early as 1670, and settlements made and a fort erected prior to 1705. Had the buffalo been a periodical visitor to that region in the numbers stated by Ashe, they could have hardly escaped the attention of the earlier writers. That bison formerly visited the central and even eastern New York can not be doubted but they were probably small companies outside their normal range.

Concerning three teeth of the bison found near Albany, N. Y., J. M. Clarke[92] remarked: "Some teeth obtained in the postglacial clays of the Hudson valley a few miles below Albany, in deposits commonly regarded as laid down during that stage of the Mohawk drainage of the Great Lakes, termed Lake Albany, have been identified by Dr O. P. Hay as those of the bison. Although entirely exact data concerning the date and location of this discovery are wanting, these teeth have come into the museum within the writer's recollection and have been kept in association with a series of other mammal relics from this vicinity." These teeth are the second and third left upper molars and the second right lower molar. When compared with teeth of the recent bison they exhibit no marked difference except in size, the fossil specimens being somewhat larger.

Interesting as evidence of the former wide distribution of the bison in New York, but of less importance to the paleontologist, are the remains found in graves and refuse pits of the Indians. Bryant[93] records the discovery of a perfect skull on an Erie Indian village site, on Cattaraugus creek, 7 miles from Lake Erie. The skull was that of a female and buried to a depth of 2 feet. A portion of the upper jaw of a bison was taken from an Indian grave at Irving, N. Y., in 1914 and brought to the State Museum by the collector, E. R. Burmaster. The fragment was identified by W. D. Matthew of the American Museum who said it belonged to an old individual whose teeth were worn down to the roots and whose premolars had dropped during life. The bone gives no indication of having been used as an implement and it may be inferred that the animal was killed in the vicinity. In August 1919, bison bones were found by Alanson Skinner in the ash-beds of a prehistoric Onondaga village site near Watertown in Jefferson county. The remains in this case consisted of hoof and toe bones and some teeth.

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[91] Travels in America, London, 1809, p. 39-41.

[92] N. Y. State Mus. Bul. 140, p. 46, 1910.

[93] Interesting Archeological Studies in and about Buffalo. Buffalo, N. Y. 1890.

Equus sp. **Horse**

It has not been generally conceded that a native species of Equus persisted in eastern North America after the last (Wisconsin) glaciation. Attention has been directed, however, to the discovery of fragments of horse bones associated with remains of the mastodon and a large bear, in a postglacial peat bog, at Monroe, Orange county, in 1901.[94] The bones recovered consist of the right ramus of the lower mandible containing four teeth, and the right femur. They were found buried in the muck of the pond bottom and their state of preservation indicates that they are of the same age as the mastodon.

W. B. Marshall,[95] in a report on a deposit of peat and marl in the town of New Baltimore, Greene county, mentions the finding of supposedly fossil horse teeth and states the circumstances as follows: " In the collections of the State Museum are nine teeth of a fossil horse which were found in 1889 by Mr Bronk Van Slyke, embedded in the peat in the southern lot. Dr Charles E. Beecher, of Yale University, has identified them with Equus fraternus Leidy." No horse teeth have been found in the collections of the State Museum which are distinguishable from Equus caballus although this circumstance alone does not prove them to be recent. Many horse teeth which are unquestionably early Pleistocene, do not differ materially from those of the recent horse, and their specific determination when the teeth alone are found, is often impossible.

In 1902, Mr Bronk Van Slyke sent to the New York State Museum remains that are recorded as belonging to a supposed Quaternary horse. The catalogue record of the specimens states that they were found in the peat of a swamp at Aquetuck, Albany county, July 16, 1902. The single tooth in the collection of the State Museum which can be referred to this locality, can not be distinguished from Equus caballus and although discolored does not appear to have undergone any other change.[96]

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[94] Clarke and Matthew, Bul. Geol. Soc. Amer., 1920, 31:204.

[95] N. Y. State Mus. 45th Annual Rep't 1891, p. 46–52.

Teeth of a horse from Troy, N. Y., which were regarded as fossil, were presented to the New York State Cabinet of Natural History[97] in 1859 and mentioned in the report for that year and in the Proceedings of the Boston Society of Natural History for 1859, 6:303-4. There is no account of the circumstances of the discovery nor are the specimens to be found in the museum's collections.

C. Hart Merriam[98] in his account of the Adirondack mammals, mentions a fossil horse under the name Equus major. "It is also worthy of remark that wild horses, larger than our domesticated stock, once roamed the borders of this region. Dr C. C. Benton, of Ogdensburg, has shown me several fossil molar teeth of Equus major that were exhumed at Keenes Station near the Oswegatchie Ox Bow in Jefferson county. I have compared them with the corresponding teeth in an immense dray-horse, and find them much larger." DeKay (ibid) applied the name, Equus major to remains of a horse found near Neversink Hills in New Jersey but as Gidley[99] has pointed out, the name is practically a *nomen nudum* as no figures or measurements were given and the original specimens lost.

In the absence of more conclusive evidence than is offered by the records presented above, the conservative view is to regard the existence of a late Pleistocene horse in New York as yet unproved.

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[96] N. Y. State Mus., 56th Annual Rep't 1904, p. r. 158.
[97] N. Y. State Cab. Nat. Hist., 12th Annual Rep't 1859, p. 109.
[98] The Mammals of the Adirondack Region, 1886, p. 145.
[99] Amer. Mus. Nat. Hist. Bul. 1906, 14:91–141.

ADDENDA

The following records, received too late to be incorporated in the body of the report, have been taken from Dr O. P. Hay's account of "The Pleistocene of North America, and Its Vertebrated Animals from the States East of the Mississippi River and from the Canadian Provinces East of Longitude 95°," published February 1923, by the Carnegie Institution of Washington. Publication No. 322.

Page 63. *Mastodon:* Erie county. A tooth found near the mouth of Buffalo creek, and recorded by Barton (Phil. Med. & Phys. Jour. v. 2, 1806, p. 157) is believed by Hay to belong to a mastodon.

Page 62. *Mastodon:* Niagara county. "At the museum of Davis Brothers, at Niagara Falls, Mr B. U. Davis told the writer that he owned two mastodon teeth which had been found in digging for the foundations of the Tower Hotel, which faces the Falls park." On later personal inquiry these specimens were not to be found.

Page 52. *Mastodon:* Orange county. "Dr F. A. Lucas, of the American Museum of Natural History, New York, stated in 1902 (Sci., 16: 169) that there is in Vassar College a skeleton of a mastodon which is supposed to have been found at Newburgh." The mastodon at Vassar was mounted by Messrs A. P. Wilbur and E. H. Eaton. Professor Eaton informs the writers that most of this skeleton came from Circleville, Ohio; 1 femur and one-half of the pelvis from Indiana, and the tusks from southern Ontario.

Page 55. *Mastodon:* Ulster county. "In Rutgers College, New Brunswick, New Jersey, the writer has seen a tusk about 10 feet long, with a considerably spiral form, which is said to have been found at Ellenville. It may, however, be the tusk of an elephant."

Page 236. *Cervus canadensis:* "Livingston county. In the collection at Princeton University is a calvarium of an elk labeled as found in Livingston county. The finder had, with a tool, chopped off the antlers and otherwise hacked the skull. One can not be certain as to the geological age of the specimen."

Page 183. *Equus:* A brief account of a horse tooth said to have been found 18 feet below the surface at Fort Schuyler, Throg's Neck, New York, is given by Charles Whittlesey in Smithson. Contr. Knowl. 1866, Art. 3, 15:16. The tooth came from a deposit described as, "compact marine drift."

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